CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

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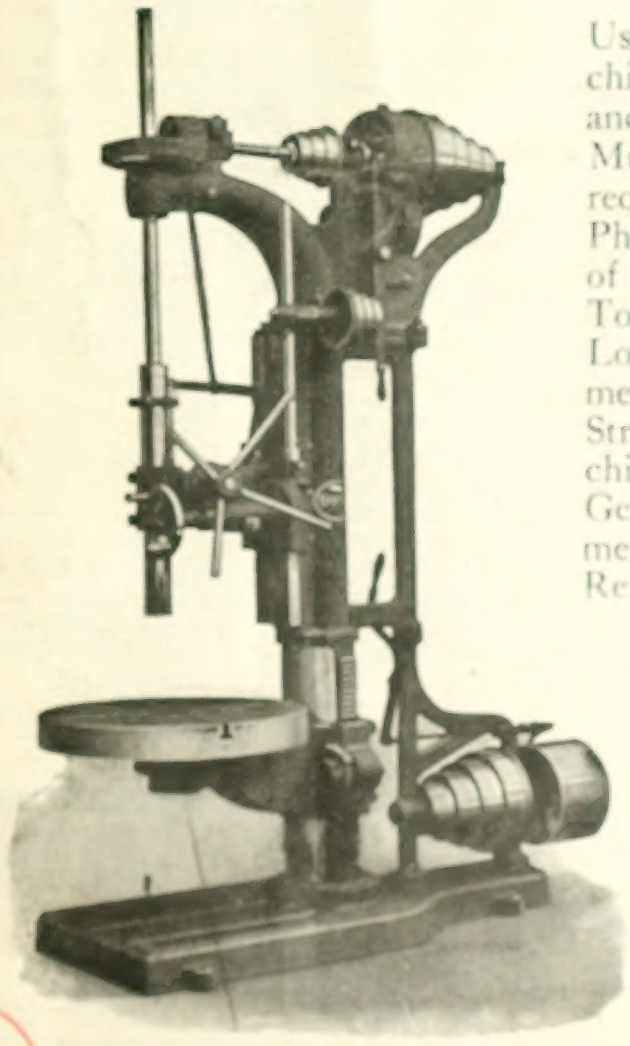
BERTRAM
MACHINE TOOLS

30-inch Vertical Drilling Machine



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Multiple Drills built to meet any requirements.
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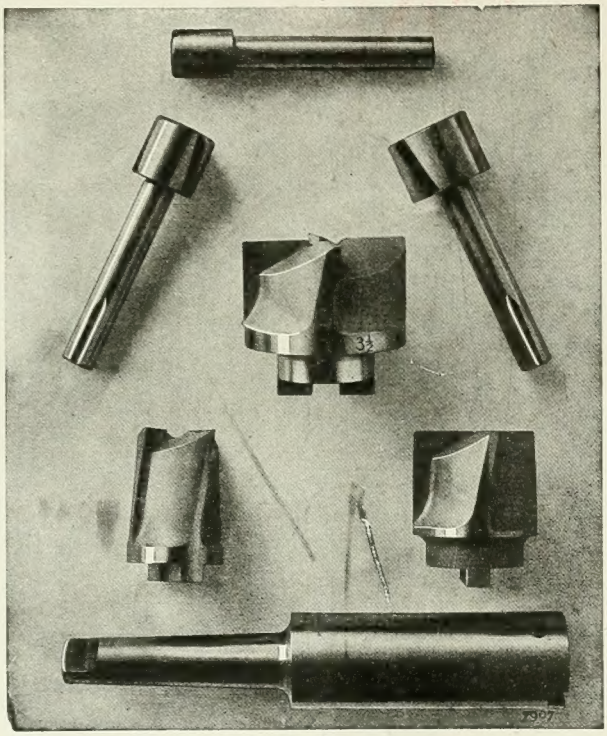
SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

and get the right combination at once.

HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

CUTTERS

Can be furnished of either carbon or high-speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face, and the guide is simply pushed further in the hole after grinding.

Holders, Cutters and Guides are furnished in a wide range of sizes.

PRATT & WHITNEY CO.

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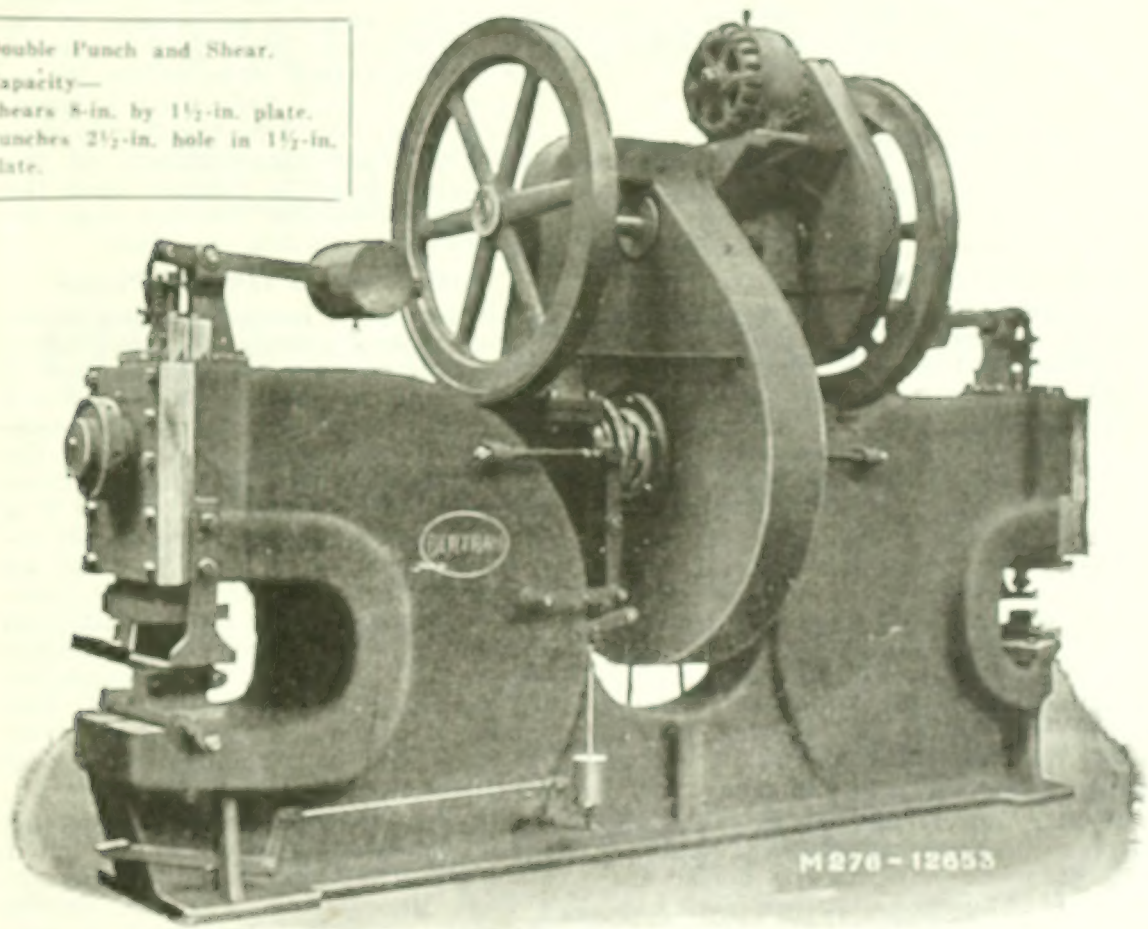
MACHINE TOOLS

For Structural Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

Double Punch and Shear.
Capacity—
Shears 8-in. by 1½-in. plate.
Punches 2½-in. hole in 1½-in. plate.



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The Publisher's Page

TORONTO MARCH 27, 1919

Flying Men Are Certainly Farsighted

Airplanes to Be Nationally Advertised

REGARDING the present as the right moment for advertising airplanes—even though markets are yet to be created—the Curtiss Aeroplane and Motor Corporation has commenced a campaign in national magazines to "sell" the idea of flying, both for commercial and passenger transport, says Printers' Ink.

Mail is now carried between New York and Washington via airplane. Service between New York and Chicago is next to be established and aerial mail will soon be delivering letters to such faraway places as Alaska and Honolulu.

It is expected that within a month American passenger aerial lines will be started; a giant flying boat capable of carrying five tons has already made a flight with fifty passengers and pilot.

Plans are under way for the construction of a fleet of dirigibles which will "sail" between New York and Chicago, carrying a passenger list of twenty-five and a crew of ten. The ships will be of the Zeppelin type, rigid housing and multiple compartment. Helium gas will be used, removing the danger of inflammability. Transatlantic flights are promised, a syndicate has been formed for aerial transport service between Buffalo, Cleveland, Toledo and Detroit, and a coast-wise service from New York to Miami is shortly to be launched.

In more spectacular fields, plans for airplane progress are maturing rapidly. San Francisco now has its aerial fire boat. It is planned that New York harbor shall be patrolled by aircraft, and airplanes are already being mentioned for guarding the forests against fire, preventing smuggling on the Mexican and Canadian borders, inspecting oil wells in Wyoming and Texas, and exploring the Brazilian interior for mahogany.

But as far as the press and general public are concerned, while realizing the accomplishments of aircraft in wartime, they do not seem to appreciate that airplane transport will soon become an integral part of our commercial life.

The Annual Aeronautical Exposition just held at Madison Square Garden, New York, and the publication of the Annual Aircraft Year Book represent the first organized effort of the Manufacturers' Aircraft Association to popularize flying. Working together in commendable harmony, members of the Association hope to impress upon the public consciousness the fact that the days of flying are near at hand.

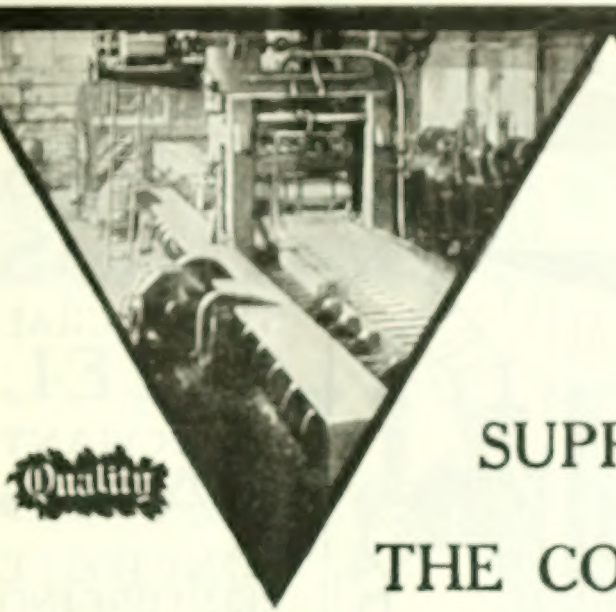
Curtiss First to Take the Plunge

The campaign just commenced by the Curtiss Corporation is an independent step of the largest airplane organization in the world to speed up things. While the Curtis people do not expect immediately to cash in on conditions to the extent that they are investing in advertising, they feel, they say, that it is a part of their individual responsibility toward the entire industry to take an active part in the public education. Commanding space will be taken in national magazines, airplane publications, motor papers, etc., which will be supplemented by smaller units discussing details. Particular attention is being paid in advertising to the boys, indicating a keen foresight of future conditions.

War has given a tremendous impetus to the construction of airplanes, and if the plans of the aircraft makers are successful, the experience gained during the past years will be turned to commercial use. Co-operating with the Government, independent manufacturers have built up immense organizations, erected mammoth factories and trained engineers and mechanics. In addition there are perhaps 17,000 pilots trained at a cost of between $25,000 and $30,000

(*Continued on page* 67)

Canadian Machinery and Manufacturing News, March 27th, 1919, Vol. 21, No. 13. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; in United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



SUPPORT

THE COUNTRY

THAT SUPPORTS YOU

If you consider your personal interests—the interests of your family and the community in which you live, you will

PURCHASE THE PRODUCTS

OF

CANADIAN MILLS

A Canadian Dollar
is Worth One Hundred Cents
in Canada

THE

STEEL COMPANY

OF

CANADA

LIMITED

HAMILTON - - MONTREAL

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

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SULPHATE OF AMMONIA

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BILLETS,
SLABS,
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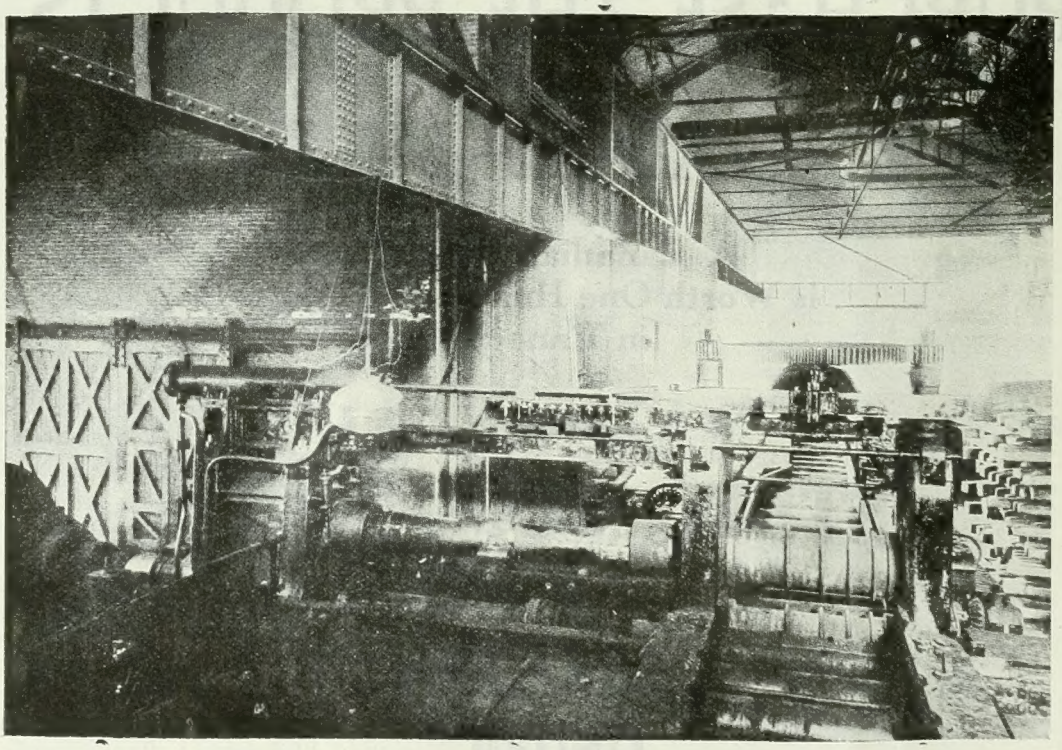
Sulphuric Acid. *Nitre Cake.*



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

BETTS

Heavy Duty Machine Tools

enjoy an enviable reputation for simplicity of design, durability, rigidity and accuracy. This is the result of fifty-eight years of concentrated effort to produce the best tools that mechanical genius can devise.

Betts heavy duty machine tools have kept pace with the demand for increased production and are to be found in practically all of the leading locomotive works, railroad shops, steel mills, shipyards, forge shops, navy yards, electrical shops, rubber factories, etc.

The machine illustrated below is a 20-foot boring mill. A general idea of its massiveness may be gleaned from the fact that there are 75 men standing or seated on its structure, and it weighs 374,000 lbs. This machine is as uniformly accurate as the 5-foot and increasingly larger sizes.

Our entire organization is at your service. Send for detailed specifications, quotation and delivery on any Betts tool.

HEAVY BETTS DUTY

Planers

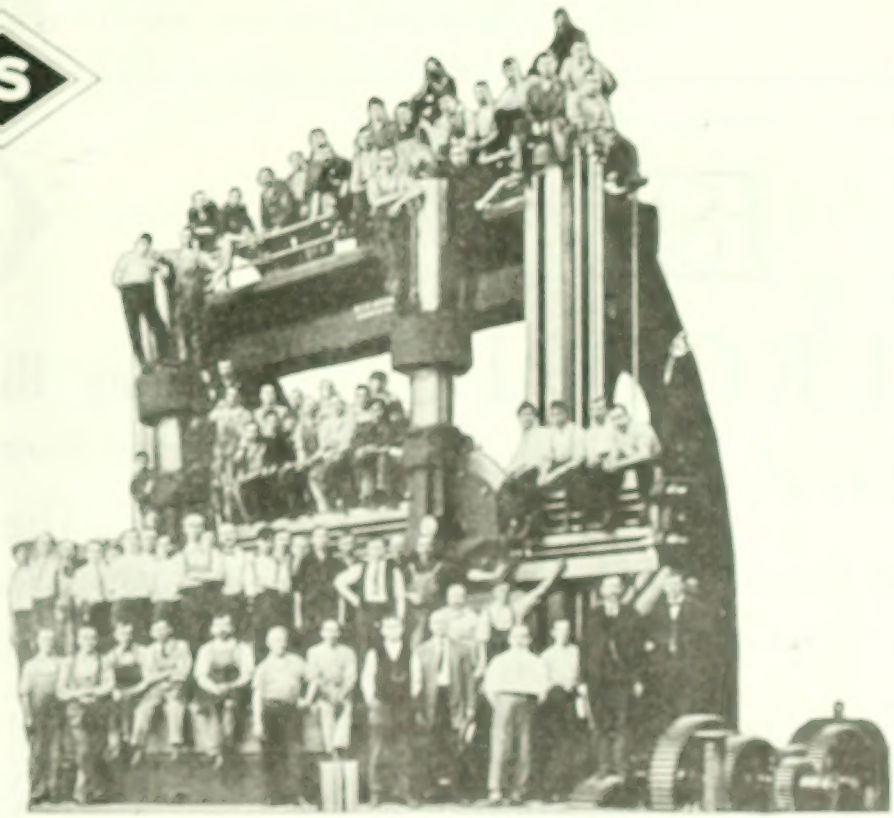
Boring and Turning Mills

Horizontal Boring, Drilling and Milling Machines

Tire Turning Mills

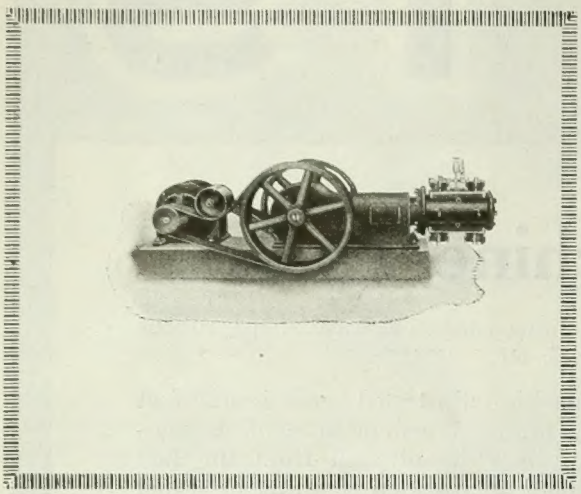
Car Wheel Borers

Crank Slotters



BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.

The Short Belt Drive For Compressors Saves Space



Have you been wondering how you can fit that compressor into your power house? Here is the solution—the short-belt drive.

We build both single-stage and two-stage machines—straight-line and duplex with this type of drive.

Less floor space
Less belt expense
No belt stretching
Capacities up to 2,000 ft. per min. with short-belt drive.

Send for our booklet on how to apply the short-belt drive to the best advantage.

Canadian Ingersoll-Rand Company Limited

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Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

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High Speed Steel

General Steel Company
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DETROIT—823 Dime Bank Building

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Machine shop foremen and superintendents who invariably specify "WILT" when requisitioning tools know WILT Drills are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use WILT Drills. To produce more economically, use WILT Drills. Elimination of breakage alone will save you much.

HIGH SPEED AND CARBON TWIST DRILLS

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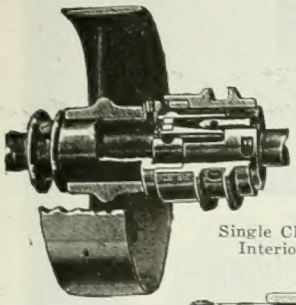
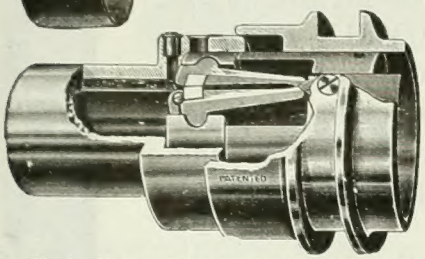
"Where there's a WILT —there's the Way"

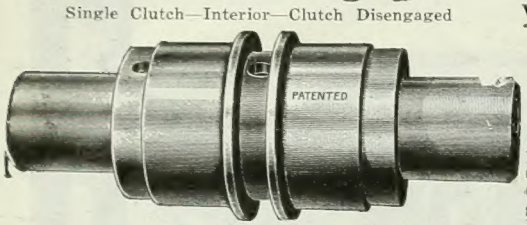
THE JOHNSON FRICTION CLUTCH



Single Clutch Pulley Mounted
Interior—Clutch Engaged



Single Clutch—Interior—Clutch Disengaged



Double Clutch

THE CLUTCH THAT CLUTCHES

starting your machines without grating noise or jar. It is the Acme of Simplicity and is being adopted by the leading machine tool builders as a part of the machine tools they manufacture, and the Johnson Friction Clutch adds another talking point. Our booklet, "CLUTCHES AS APPLIED IN MACHINE BUILDING," is of interest to you and a copy will be sent on request. For countershaft or line shaft work the JOHNSON FRICTION CLUTCH gives the service you are looking for.

Our Yellow Data Sheets describe the Johnson Friction Clutch in detail. Write for them to-day.

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Coal
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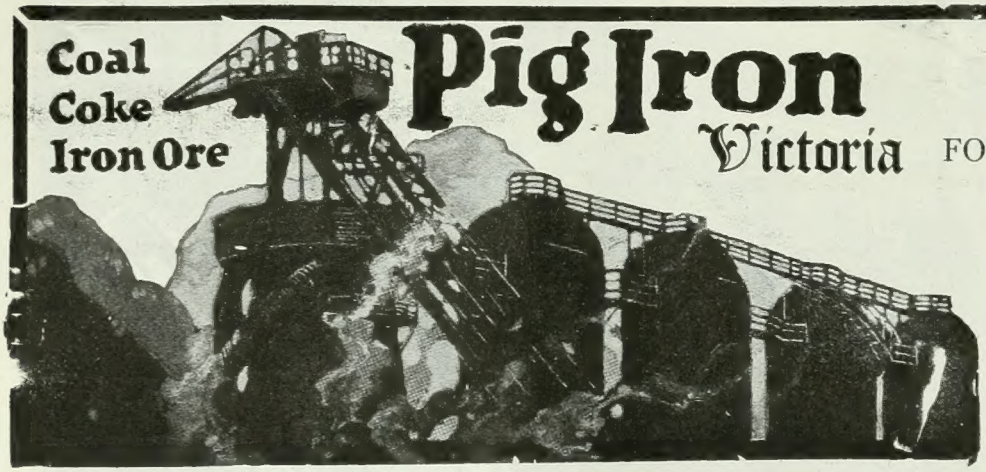
Iron Ore



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Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
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M.A. HANNA & Co.

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FIRTH'S Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
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J. A. SHERWOOD
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Frogs, Switches
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for Steam & Electric Railways

Built-up, Hard Centre or Solid Manganese Steel

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COMPLETE INTERSECTIONS

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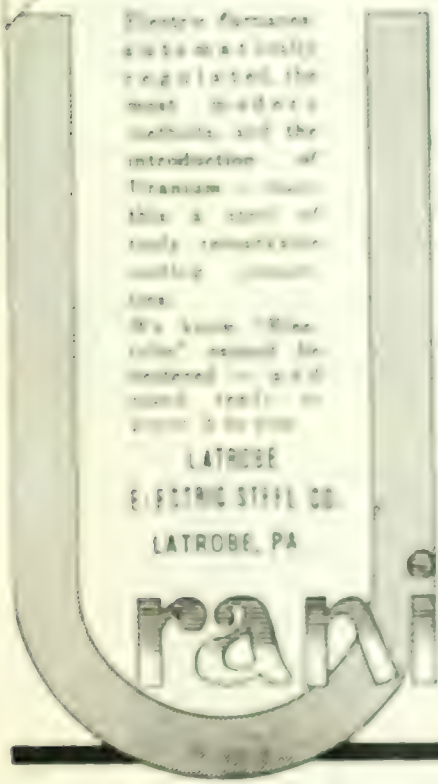

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LOCOMOTIVE AND CAR
WHEEL TYRES

HIGH-SPEED AND CARBON
TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH
OF CANADA, LIMITED

FORD-SMITH MILLERS

The Last Word in Accuracy and Production

In the keen competition about to begin both for home and export business, only the efficiently equipped and economically run shops will succeed. The use of Ford-Smith Millers for accurate, general work, and quantity manufacturing will help you to the desired results.

Get in touch with us. Our service is at your disposal.

The Ford-Smith Machine Co.
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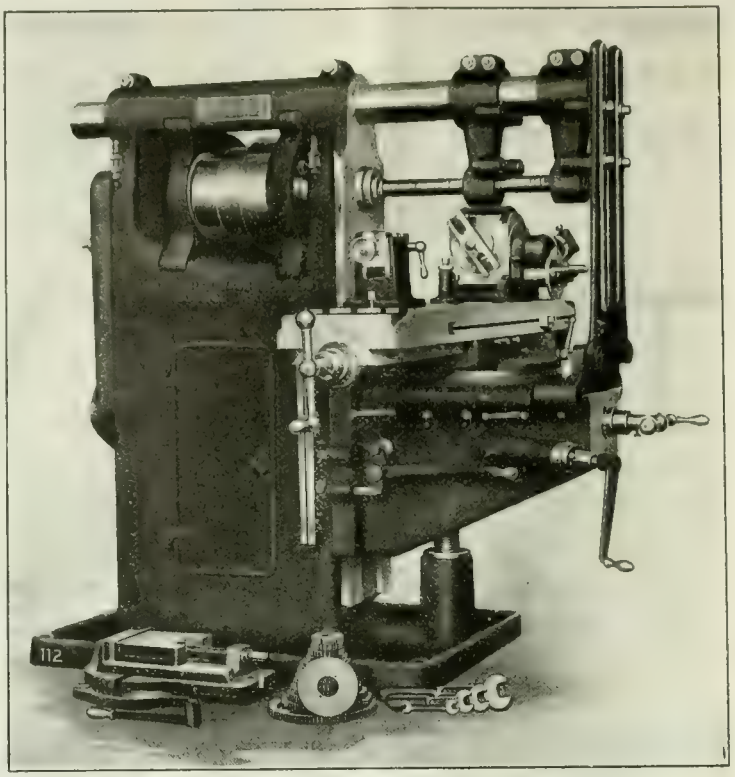
Hamilton, Ont., Canada

FOREIGN AGENTS: W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert, Limited, 54 Dey St., New York, U.S.A.



Plain and Universal Milling Machines

IMPERIAL GENUINE BABBITT METAL

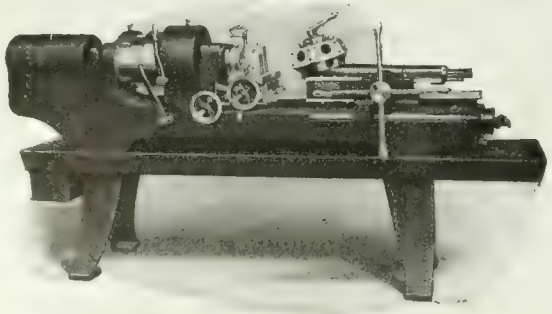
The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg Vancouver

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



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SEND FOR
CATALOG "C"
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ASK THE USER

WOOD TURRET MACHINE CO
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STEEL *for*

Every Commercial Purpose

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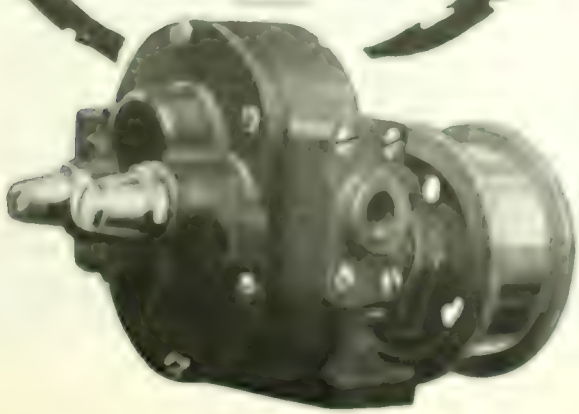
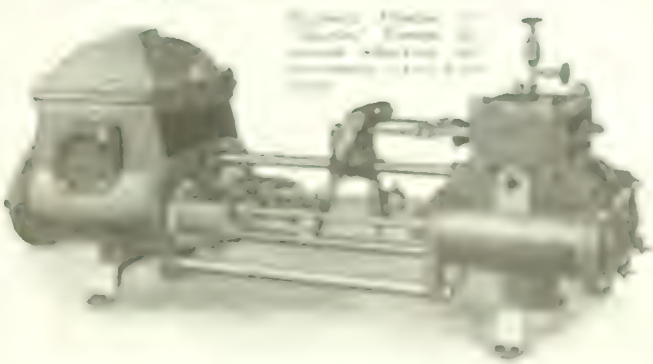
should equip their machines with

TRAHERN
Rotary Geared Pumps

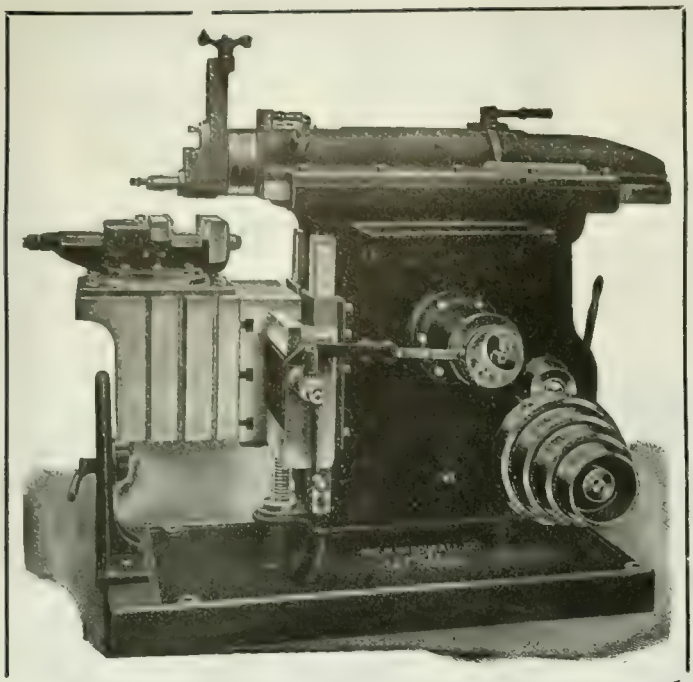
TRAHERN PUMP COMPANY



Hepburn Pumping Machinery



JOHN T. HEPBURN, LIMITED



McDougall SHAPERS

Combine the best features of all machines which have hitherto been placed upon the market, and nothing has been included, except those points which experience has shown to be essential.

An examination of the construction will reveal features that make for increased production, ease of operation and accuracy.

Write for descriptive literature.

The R. McDougall Company Limited

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Direct representatives of foremost Swedish mills: makers of

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ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900 Aliquippa Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

CANADA
FOUNDRIES & FORGINGS
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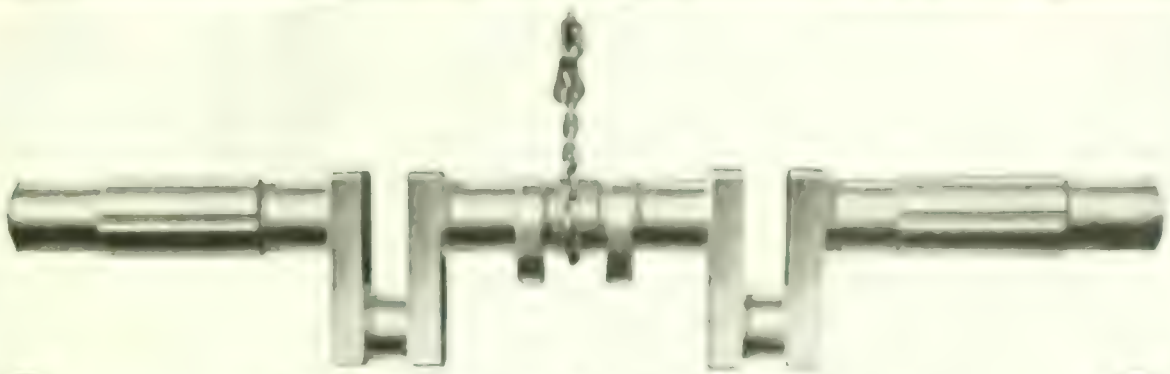
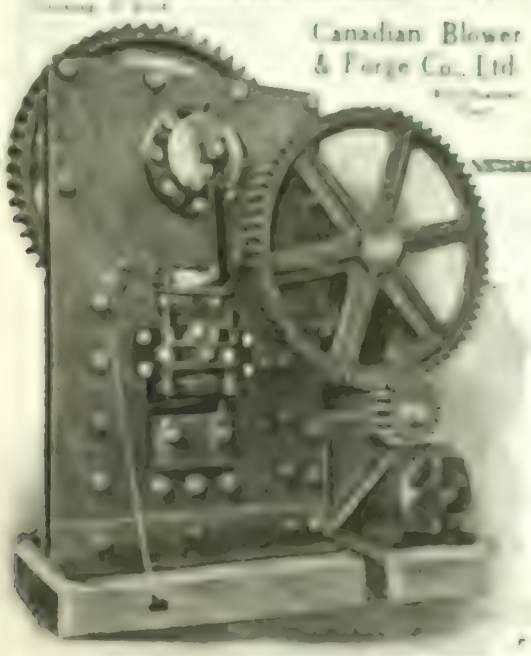


Why Worry! Bring It To Us If It Is a Forging

Canadian Billing & Spencer Plant
Welland

CANADIAN ARMOR PLATE

Canadian Blower & Forge Co. Ltd



Jardine Universal Ratchet Drill

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

The "RACINE"

For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

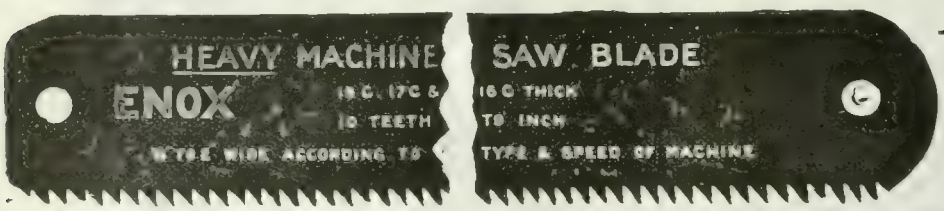
Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue
RACINE, WIS., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER



ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

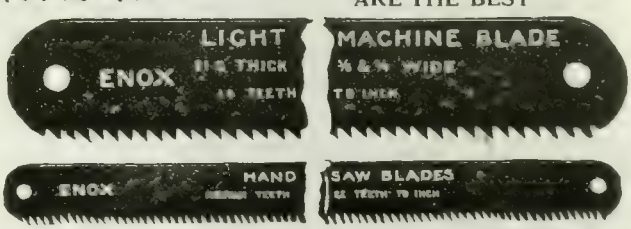
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

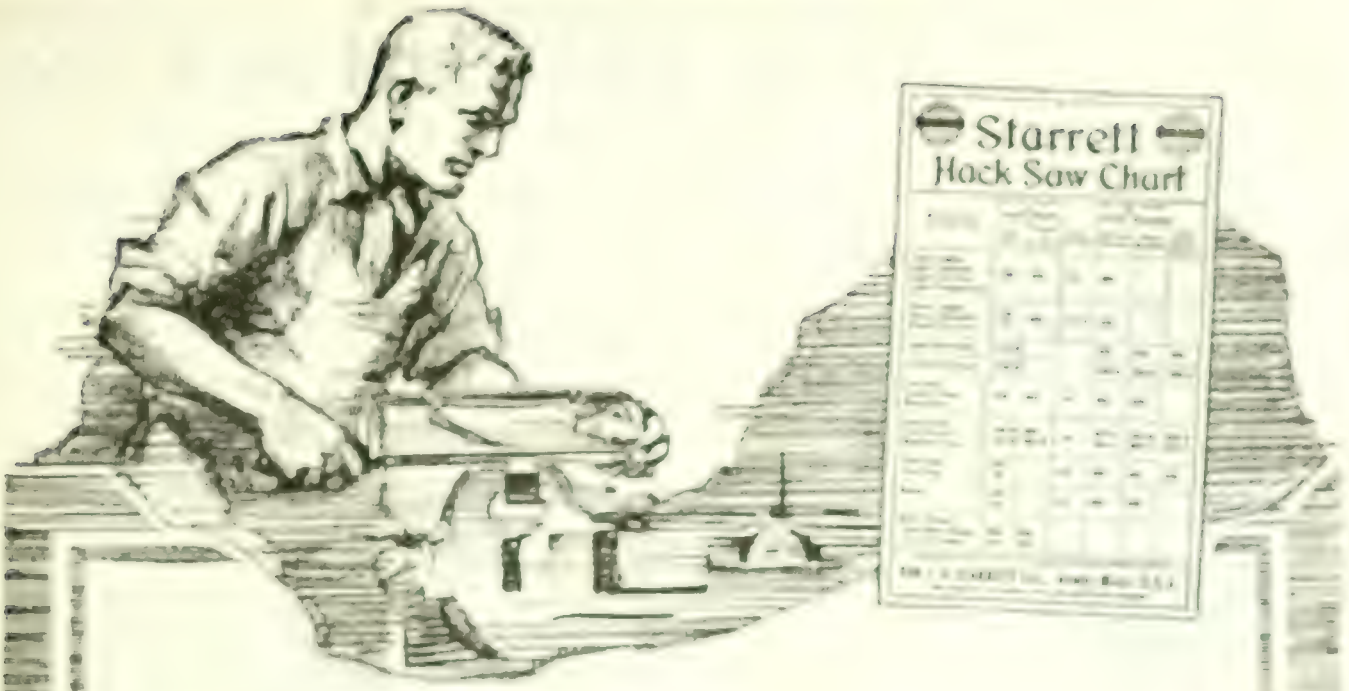
46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10



Agents for Canada, East of Fort William:

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



Starrett Hack Saws
meet—EXACTLY—any cutting requirement

From the standpoint of efficiency and economy you can readily understand the importance of being able to get the right saw for any cutting requirement.

Starrett Hack Saws

are made in a number of styles and sizes, each one for a certain class of work, tested and "set" to be the most efficient for that given material.

Our Starrett Hack Saw Chart tells you at a glance which one to use for each type of work. Also see the new Catalog No. 24A. It shows 2,000 styles and sizes of fine cut-to-length tools and hack saws.

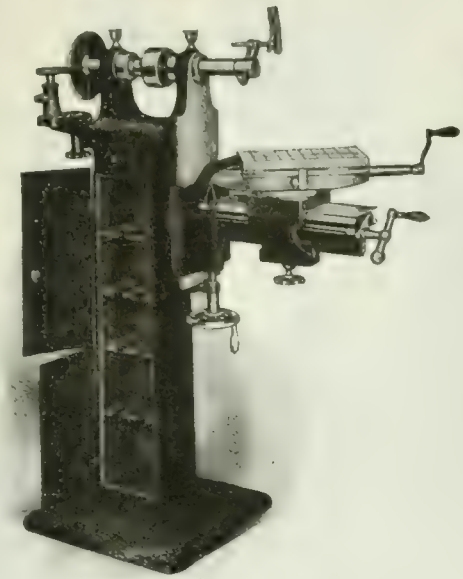
The L. S. Starrett Company

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

ATHOL, MASS.

New York | London | Chicago

OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriege is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14″ x 6″; SURFACES, 9½″ x 6″

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

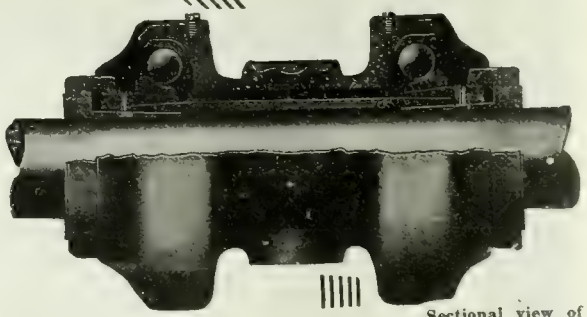
Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.
Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their ecenomy.

One of the many types of frames we fit.

Chapman Double Ball Bearing Company of Canada, Limited

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.

STELLITE

The Stellite Mfg. Co., Ltd.
Toronto.

Gentlemen:

We beg to advise that in spite of the rise in price of important steps taken Milling Cutters, and can still secure a Canadian product at pre-war prices.

During the war, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of Munitions, we did not raise our prices notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

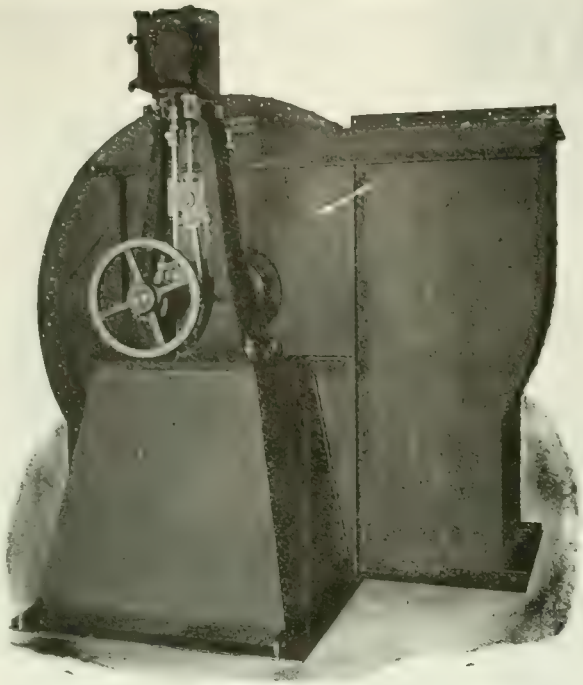
We are, Sirs,

Yours respectfully,

DELORO SMELTING & REFINING CO., LTD.

Deloro Smelting & Refining Company, Limited

TORONTO
HEAD and WORKS: DELORO, ONT.
MONTREAL



HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

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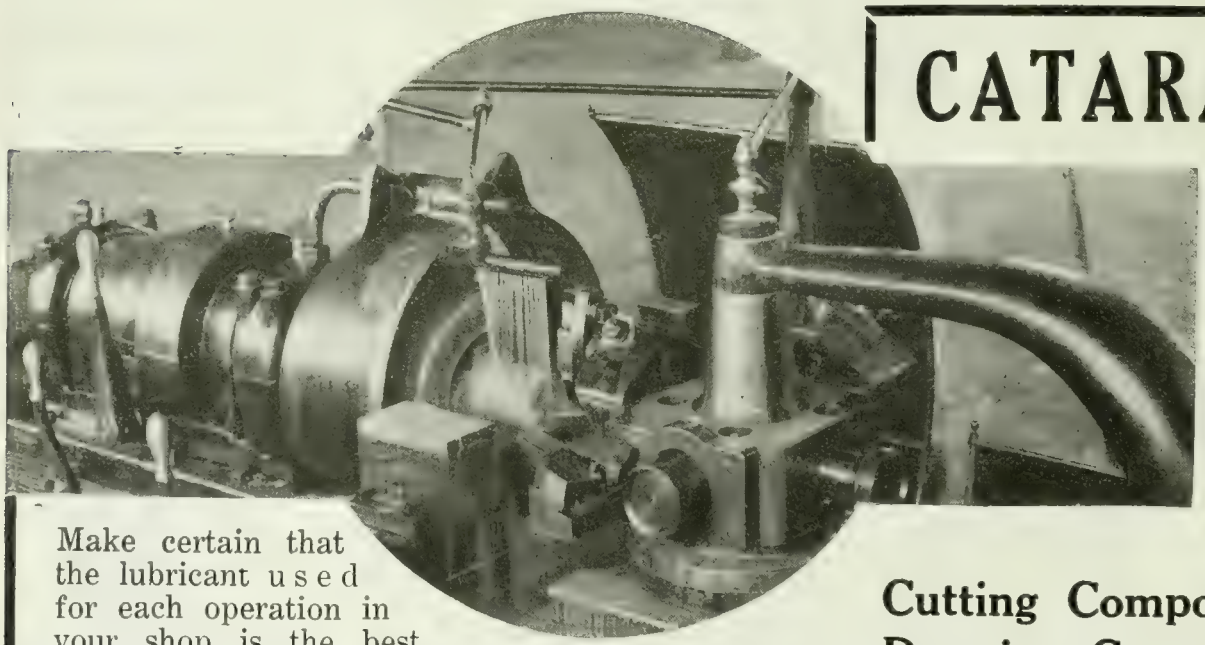
Toronto (Canada) Office: 609 Kent Building

Messrs. Ross & Greig, 412 St. James St., Montreal, Que.
Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.

AGENTS:
Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.



CATARACT

ACME
MYSTIC
SPECIAL

Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

Cutting Compounds
Drawing Compounds
Cutting Oils
Quenching Oils

Cataract Refining Company, Limited - Toronto, Ont.

DODGE PRODUCTS

Turret Lathes

We are manufacturers of a line of Turret Lathes embodying original features which have been tested and not found wanting by *your* and *hard* and *your* users

The Dodge Features, Etc.

The Dodge features—only in our lathes—minimize floor space—use cut link and superthoom belting—reduce shafting, hangers and pulleys—stimulate the operator—increase production—reduce manufacturing costs.

Our line of lathes made in several sizes, we recommend to all shops making products from bar stock, castings or forgings. For duplicating work they are unexcelled for quality and quantity production.

Printed matter will be mailed you promptly upon request.

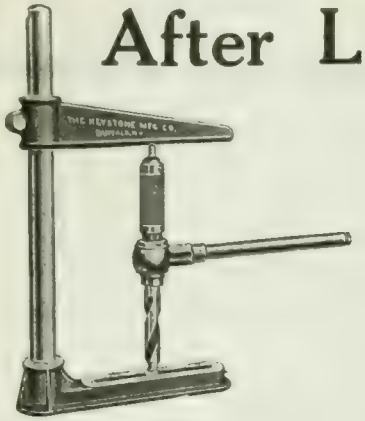
Screw Machine Products

H. C. DODGE, INCORPORATED

Machinery Manufacturers
Hand and Automatic Screw Machine Products

BOSTON 32 to 46 Alger Street MASS.

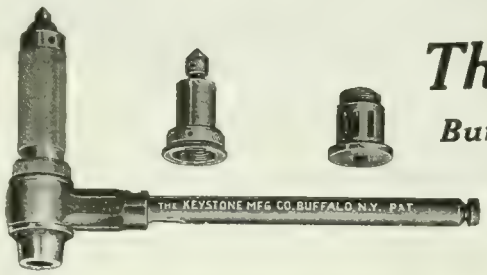
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



We like to think of that.

We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

Write for name of nearest dealer.



The Keystone Mfg. Company

Buffalo, N.Y., U.S.A.

TERRY

a washer for every want

For PEACE delivery

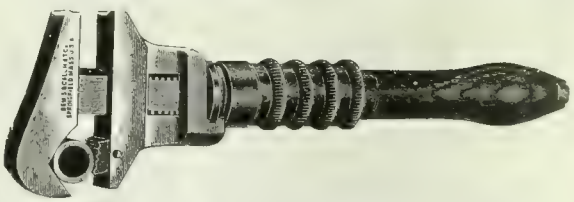
NOW that export conditions are such that we can be of service, we can arrange for peace-time requirements.

Our service can meet every washer need. We welcome correspondence.

HERBERT TERRY & SONS, LTD., the Spring and Presswork Specialists, Redditch, Eng.

Established in year 1855.

Codes, A. B. C. 5th, Liebers and Western Union.



USE B. & C. WRENCHES

At the top is a combination nut and pipe wrench, with head, bar and shank, a one-piece forging of great strength. The lower illustration shows our adjustable "S" wrench, whose sliding jaw is a steel drop forging. All parts of each wrench are interchangeable.

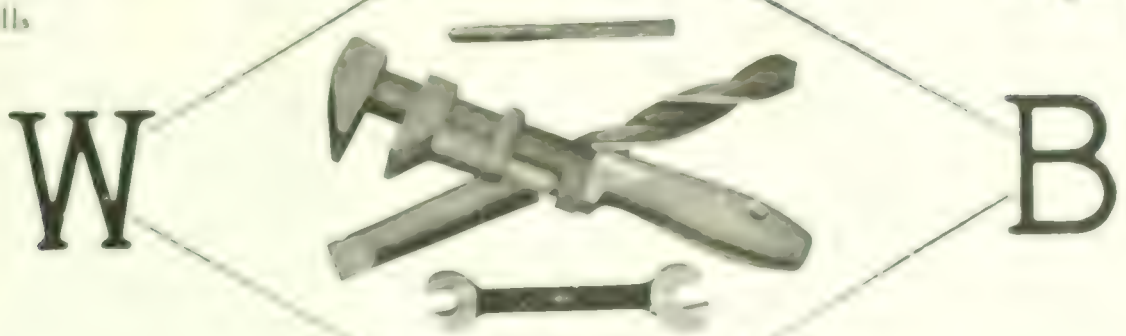
Write For Catalogue

BEMIS & CALL HARDWARE & TOOL CO.
SPRINGFIELD, MASS. - - U.S.A.

WHITMAN & BARNES

Reamers
and
Twist Drills

Screw and Drop
Forged Wrenches
Hammers



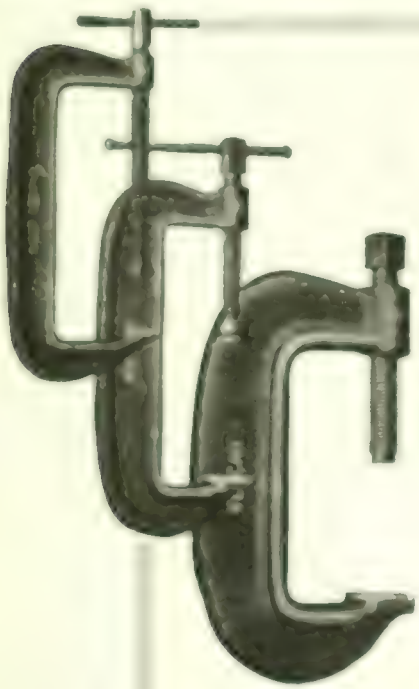
Special
High Grade
Drop Forgings

Cutters
Chisels
Punches, Etc.

THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY - - ST. CATHARINES, ONTARIO



Williams' Superior Drop-Forged "C" Clamp

"THEY STAND THE STRAIN"

J. H. WILLIAMS & CO.

"The Drop Forging People"

45 Richards St. Brooklyn, N. Y.

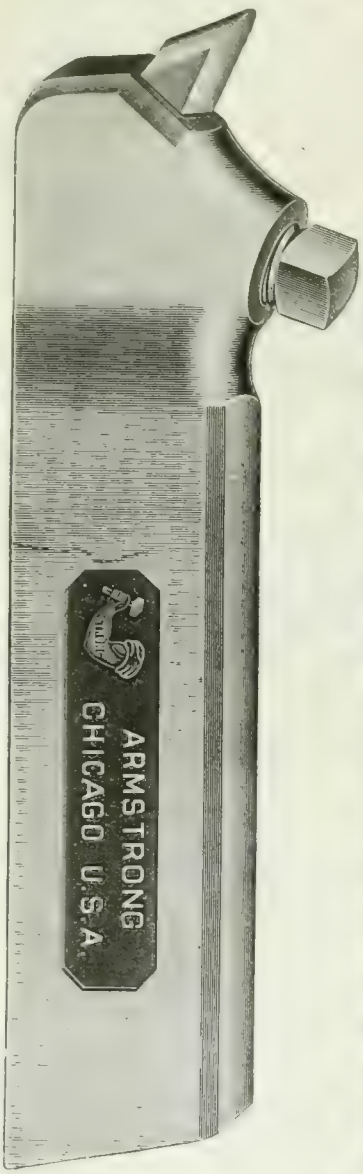
The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the

PANAMA-PACIFIC EXPOSITION

WAS WON BY

ARMSTRONG TOOL HOLDERS



HIGHEST AWARD

at 4 World's Expositions

Paris - - -	1901
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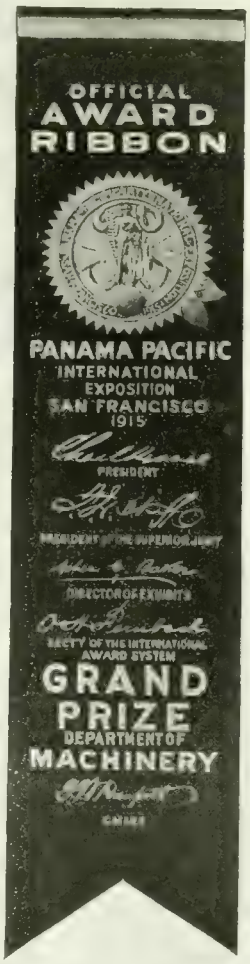
THEY ALWAYS MAKE GOOD



They Are Saving Millions of Dollars in High Speed Steel

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Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

AWAY WITH DULL FILES

One hour's work with a dull file will cost you more in wasted labour than a new file.

Tell your men, therefore, to turn in files the moment they have passed their efficient point.

But to get files that give the longest efficiency, specify "famous Five" when you order.

They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

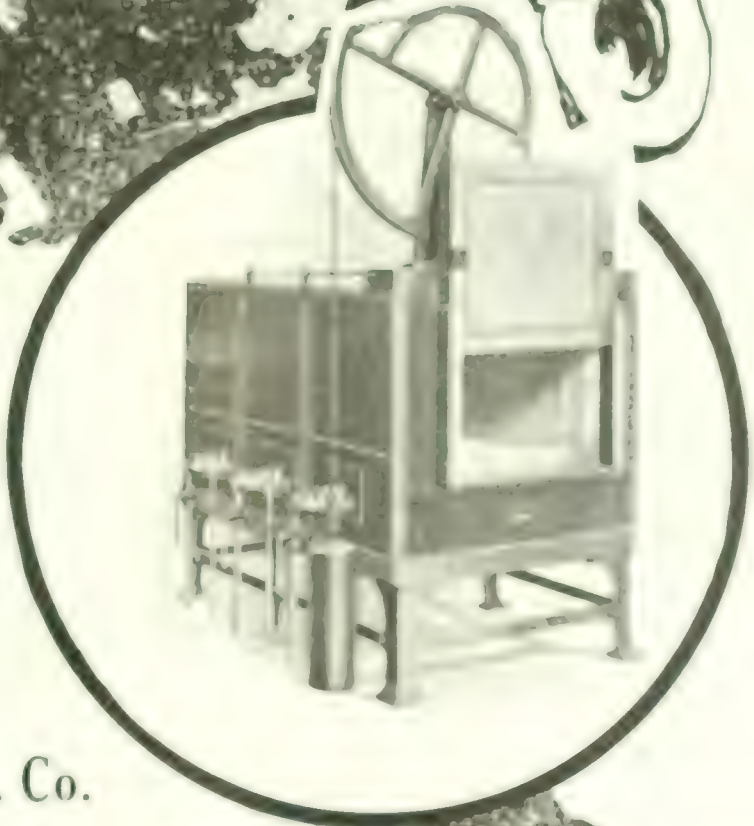
NICHOLSON FILE CO

PORT HOPE
ONTARIO

-And I Always Thought That Was A Good Tractor-

You Cannot Afford to Take Such Chances

GILBERT & BARKER
Heat-Treating Furnaces

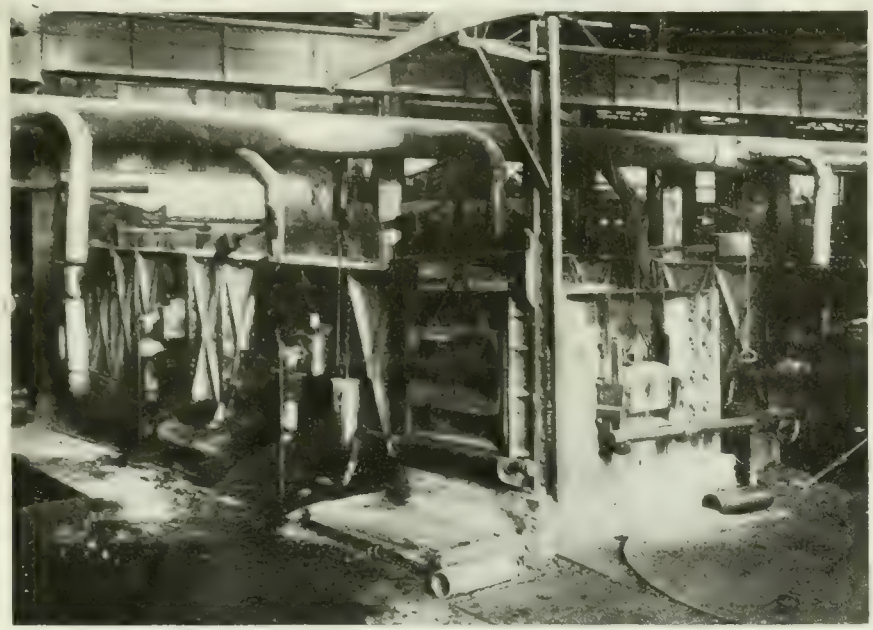


Gilbert & Barker Mfg. Co.

SPRINGFIELD, MASS. U.S.A.

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

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Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.

Rivet Heater

For

Annealing
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High Speed Steel
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Cool Shop This Summer

If You Use

EONOMIZER FORGE

IT is economical in power; protects workmen from flames and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

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Furnace Engineers and Contractors
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(Hudson Terminal Bldg.)
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"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the cost of an expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also bevelling and splitting of plates. Built in various sizes having capacities from 16 up to ¼" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
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GRANT

Spins a Polished Rivet Head Every Second Without Noise

The Grant Mfg. & Machine Co.
Holland Ave., Bridgeport, Conn.

STEEL STAMPS

FOR MARKING ALL CLASSES OF METAL WORK

We will Give You Satisfaction on all Work of this Kind

PRITCHARD-ANDREWS CO.
OF OTTAWA
294 SPARKS ST. OTTAWA, CAN.

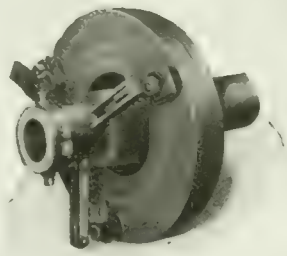
WILLIAMS & WILSON, LIMITED

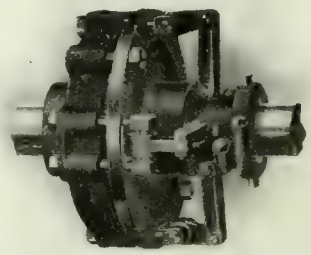
Cable Address "Willwills" Montreal, P.Q. Established 1891

"COMPETITOR" FRICTION CLUTCHES

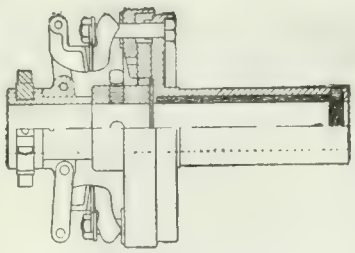
No! Don't Misunderstand Us

This is not a Competitor of other Makes of Friction Clutches. "It has no rivals." It is a competitor of the Troublesome loose Pulley.





Friction Clutches give far better results than tight and loose pulleys and are more readily operated, also more economical, as the saving in time and belting, the protection of machinery and the prevention of accidents will pay many times over during a year their original cost.

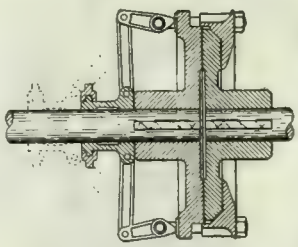


Competitor Pulley Clutch

Be Up-To-Date. Don't Install a Tight and Loose Pulley. Install a "Competitor." This will do away with tight and loose Pulley troubles and the First Cost is very little more.

By the use of friction Clutch Cut-off Couplings, sections of the line shaft or various departments can be shut down without interfering with any other portion of the plant. This is especially advantageous when it is necessary to make repairs during working hours, or to run one department when the remainder of the plant is closed.

When friction Clutches are used for driving direct to machines, the load is picked up gradually while the line shaft is running full speed. Each machine is operated independently.



Cut-off Coupling

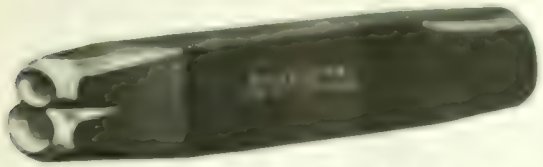
Worrall Type

For your large, heavy Drives. The "WORRALL" Clutch has No Equal.

We carry a full line of these Clutches in Stock. In all sizes and Bores.

WILLIAMS & WILSON, Limited, Montreal, P.Q.

MARK YOUR PRODUCTS
THE "MATTHEWS" WAY



"Matthewsweld" steel plates and lettering dies make easily read and durable marks on all classes of products. Matthews Thumptron Type Holders—for flat and curved surfaces—with interchangeable Steel Type, save time and lower marking costs. Matthews Inspection Hammers of best Pittsburgh Steel, are fashioned with the "know how" of over 50 years experience.

Booklet "For Light and Heavy Marking" sent on request
Write for a copy of it

Canadian Fairbanks-Morse Co., Limited

Wholesale Dealers in Scales, Gasoline Engines, Pumps, Electrical Machinery, Saskatoon, Calgary, Edmonton, Regina, Winnipeg, Brandon, Fort William, Toronto, Hamilton, Windsor, Montreal, Quebec, Ottawa, Moncton, Halifax, St. John, Vancouver, Victoria

Jas. H. Matthews & Co. Pittsburgh, Pa.

Sand Cutting Machines and Testers

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"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete. Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Agents Wanted

Notes on Grinding

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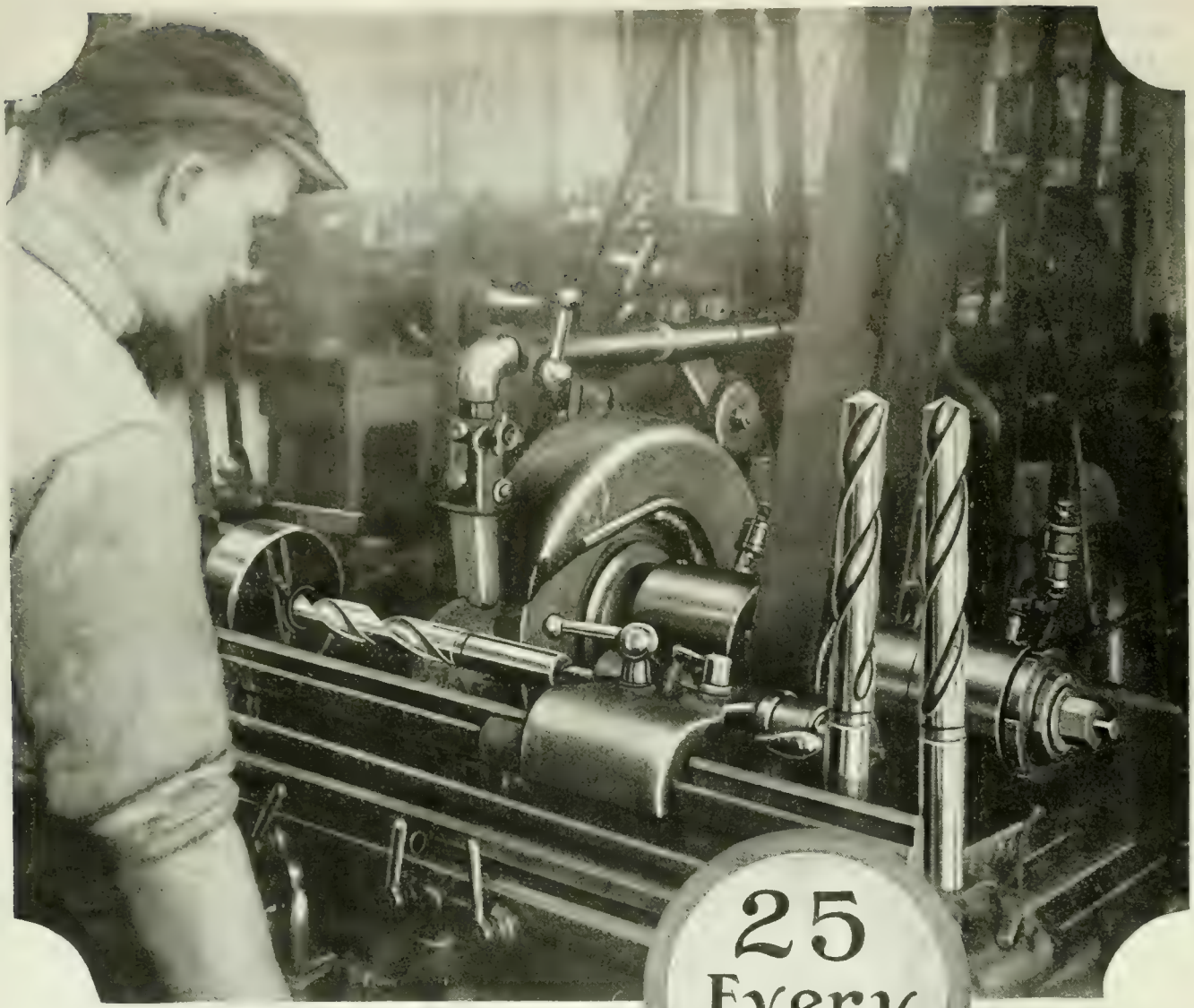
WORCESTER, MASS.

Significance of Grain and Grade

GRAIN

GRADE



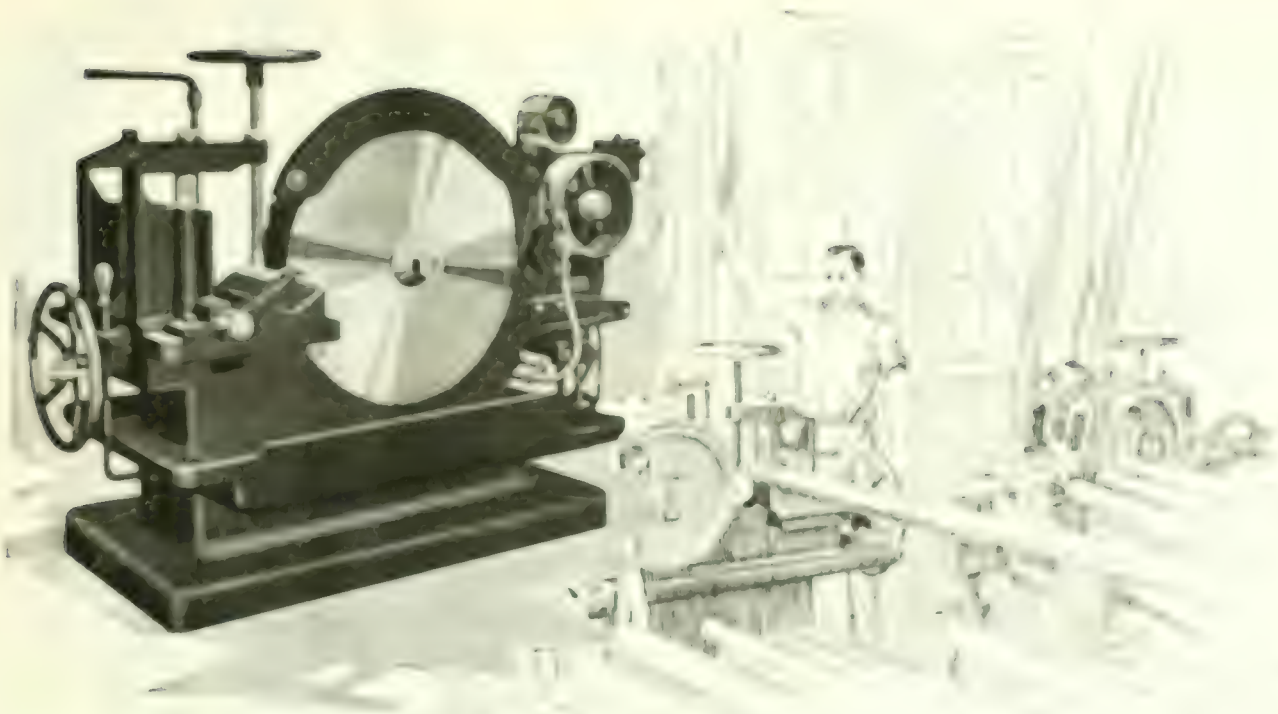
Interested in Drill Grinding?

The above shows a view in the plant of the best-known twist drill manufacturing company. The operator is producing 25 Straight Shank High Speed Steel Drills each hour of the day. These are 1½ in. diameter, and are finished to an accuracy of .0005 in. Fair production, good finish, accurate work. Compare your results with this example, and if you need information, let us hear from you. Our Service Department is at your disposal.

Norton Grinding Company, Worcester, Mass.

Chicago Store: 11 North Jefferson Street

Vonnegut Machinery Company, Indianapolis, Ind. Robinson, Cary & Sands Company, St. Paul and Duluth, Minn. Manning, Maxwell & Moore, Inc., St. Louis, Mo. Henry Prentiss Co., New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. The Motch & Merryweather Machinery Company, Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cincinnati, O. Eccles & Smith Company, San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. The Canadian Fairbanks-Morse Co., Ltd., Montreal, Que.; Toronto, Ont.; Vancouver, B.C. C. T. Patterson Company, Ltd., New Orleans, La. Kemp Machinery Company, Baltimore, Md. W. E. Shipley Machinery Company, Philadelphia, Penn. English Tool & Supply Company, Kansas City, Mo. Alfred Herbert, Ltd., Coventry, Eng.; Paris, France; Milan, Italy. The F. W. Horne Company, Tokio, Japan. Iznosskoff & Co., Petrograd, Moscow and Ekaterinburg.



Steel Economy

The use of Nutter & Barnes Automatic Metal Cutting-Off Saw Machines in the steel shed effect a real economy in steel.

These high-powered machines drive an exceptionally small, narrow saw, considering their capacity. Consequently the wastage of steel is reduced to a minimum.

On the other hand, they are big producers. Nutter & Barnes Cold Saws are used by some of the largest shops in the world. *They can help you!*

GTD

Greenfield Tap and Die Corporation

GREENFIELD, MASSACHUSETTS

Canadian Agents:

WELLS BROS CO. OF CANADA, LTD.

GALT - - ONTARIO

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of "Red Cut"?

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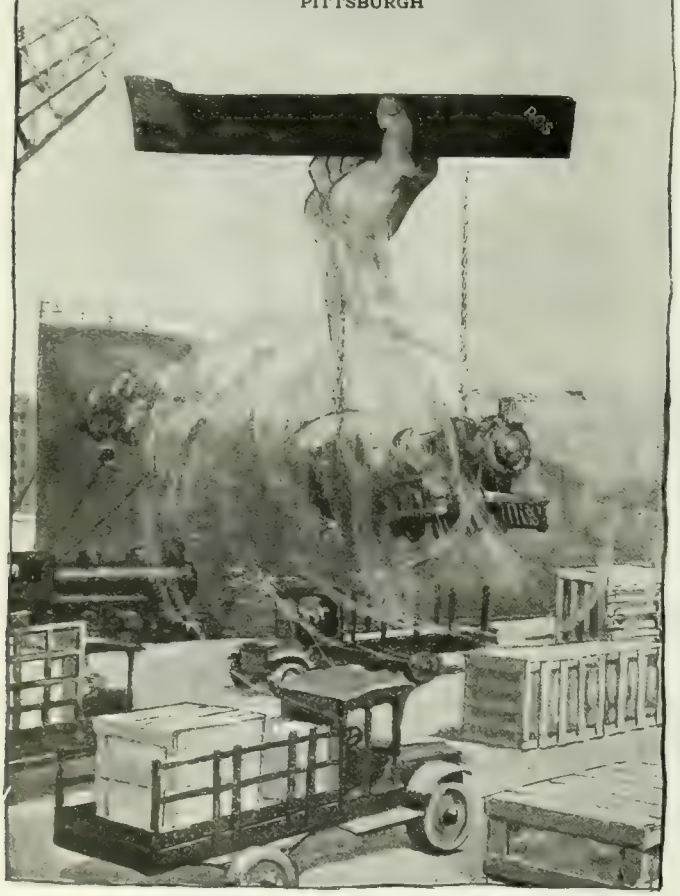

P H

TRADE MARK

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Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Ingersoll File Company, Limited

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Sole Selling Agents

John Morrow Screw & Nut Co., Ltd.

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IMPERIAL

TRADE MARK

D F & S Co. Quality & Service

Forgings and Steel Stampings

OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

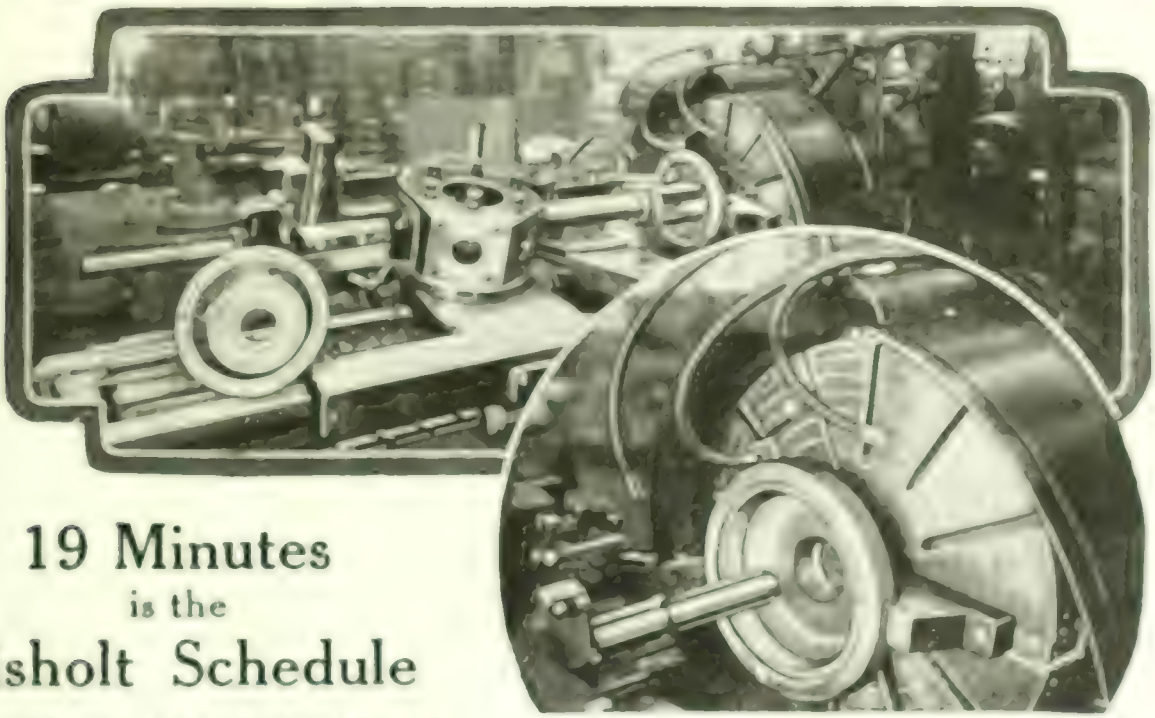
OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

Dominion Forge & Stamping Co., Ltd.

WALKERVILLE, ONTARIO

Toronto Office: 510 Lumsden Building

GISHOLT



19 Minutes
is the
Gisholt Schedule

for finishing this 5-ton Truck Differential part made from Drop Forged Steel, 20 to 30 Carbon as shown by the drawing. Gisholt production is always dependable.

A new book showing the Gisholt Turret Lathes and the work they produce is ready for distribution. Send for your copy.

GISHOLT MACHINE CO.,

CANADIAN AGENTS: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

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Dick's Original Balata,
Graton and Knight Leather.
Goodyear Extra Power.

Each considered the best of its particular kind. One of the three will solve absolutely every belting problem.

Everything in Mechanical Goods

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Fairbanks-Morse
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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Manufacturing the Banner Hosiery Machine--Part I

These Articles Will Follow Up From Time to Time the Actual Manufacture of These Machines, and the Various Operations Will Be Illustrated With Interesting Photographs

By ROBERT GARDNER

coarse gauge hosiery, as used for the army, and men who work in the woods, and similar trades where warm clothing is necessary, as well as strong and durable goods.

By referring to the illustration, it will be noticed that the yarn is fed through several guides into the yarn levers, and from there into the needles.

The cylinder which carries the needles, revolves by means of bevel gears, driven from the pulley to the right of the machine.

The stitches are produced to make the stocking by the medium of stitch cams, which may be observed at the right hand side of the cylinder. The widening cams are on the left hand side of the cylinder, and their duty is to pick out the needles, one for each revolution of the cylinder while knitting the leg.

This operation produces the shape of the leg, which cannot be done when stockings are knit by the hand method.

This machine being fully automatic, all changes are made from the toe to the heel, and also on the leg by means of the chain which may be seen at the lower right hand side.

These various changes are obtained by means of lugs at certain predetermined positions, which raise cams which throw in or out certain needles, thus widening or narrowing the diameter of the stocking.

The number of yarns which may be used is determined by the number of fingers or levers used on the machine.

The coarse gauge machine shown has only two of these fingers, which admits only two colors or thicknesses of yarn.

The fine gauge machine, which will be illustrated next, has five fingers, thus permitting five or more yarns of various colors or textures, in so much as these fingers on this machine have more than one eye, thus one finger can carry two or three strands of yarn.

It will thus be seen the fine gauge machine is designed to make the fancy hose, as is often seen in use.

In Fig. 2 is shown a side view of one of the fine gauge machines, which is used when knitting the more expensive hosiery.

A sample of the work is here illustrated as coming from the cylinder.

It may be observed here that these machines are made on the production basis, the body for each machine being the same.

When a fine gauge machine is needed, it is, therefore, only necessary to attach a fine gauge cylinder and needles, and the machine is ready for service.

A coarse gauge machine is also fabricated in a similar manner by fitting the cylinder and needles for that type onto the standard frame and body.

Sample of Hose

The half-tone, Fig. 3, shows a stocking as it comes from the machine.

It will be noticed how the leg, heel and toe are produced perfectly, leaving only a small opening at A.

This opening is closed in a subsequent operation by another special machine designed for that purpose.

The first thing which impresses a visitor to the plant here described, which is modern in every way, is the large number of special tools and methods employed for the manufacturing processes.

Apparently, wherever a tool could be used to advantage it has been designed and put into service. I have visited hundreds of plants in various parts of the country, but at the Hemphill factory one phase of manufacturing has been further developed—namely, special tooling on automatic machines to obtain interchangeable and extensive production

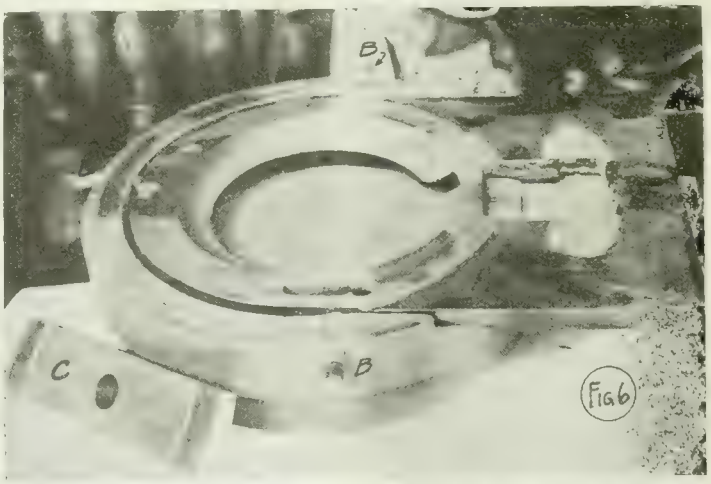
Most plants seem to neglect this factor, attention is paid to drilling machines and milling machines, and there the special tooling methods cease.

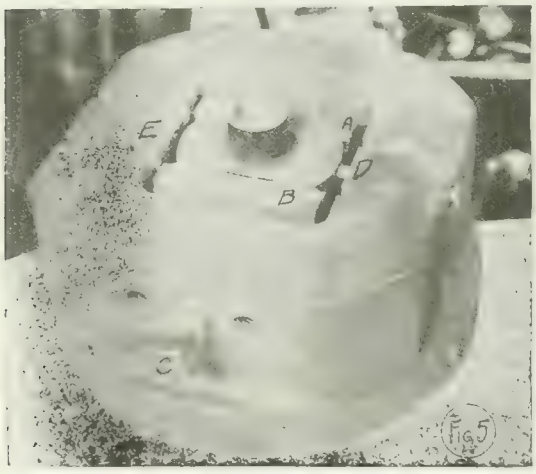
In this section of the article I shall endeavor to illustrate and describe some of these special tools used on automatics.

When machining the transfer cap two operations are necessary.

These elements are made from steel forgings, and are first held in a three-jawed universal chuck and the inside bored out to a plug gauge.

The transfer cap is then placed on the fixture shown in Fig. 4, which is held on the face plate of the Jones & Lamson automatic by means of three





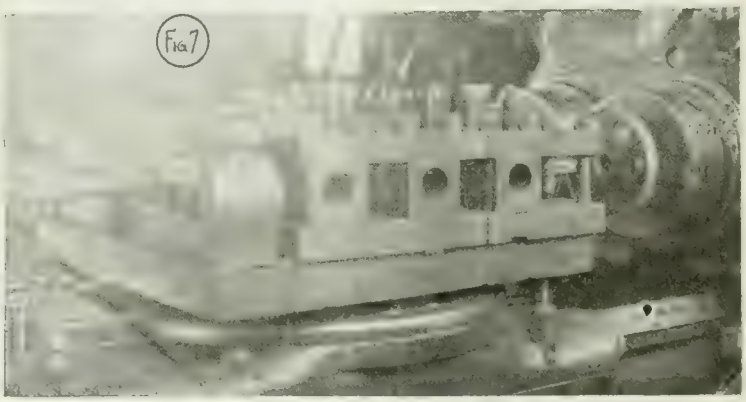


FIG. 4 MACHINING THE TRANSFER CAP
FIG. 5 MACHINING THE SHAFT BEARING

FIG. 6 MACHINING THE CIRCULAR BASE
FIG. 7—MACHINING THE MIDDLE PULLEY

will be one of these cases, namely, The Middle Pulley.

The half-tone, Fig. 7, shows a rear view of the machine with the turret carrying the various tools for the several operations.

The work performed in their correct sequence is turning the outside diameter of the pulley facing the flange to the correct width, boring the centre hole, then reaming to size. The tools used for the last operation are shown at the left of the illustration.

A close-up view of this machine is shown in our next picture, Fig. 8.

It will be noticed that the pulley castings are held by the jaws of a three-jawed universal chuck.

These jaws hold the casting by the centre hubs, so that the tool used for facing the flange to width does not strike the jaws, but can pass down without leaving any surplus material which would have to be machined away in a subsequent operation.

The tools used for turning the outside of the flange may be seen at A, and, as will be observed, these are made of a short piece of high speed steel of a circular section, the cutting edge or face being ground flat with the necessary rake for cutting.

The turning tool is held in the holder by means of a setscrew tapped in the end of the holder and by such a medium the tools may be easily removed for grinding.

Being of round section they may be made very easily and cheaply, it being only necessary to cut the required length from a bar and grind the cutting edge as noted.

The stitch ring is made from a special bronze mixture and the first operation is boring the hole to a plug gauge.

For this purpose the casting is held in a three-jawed universal chuck, the work being again performed on a Jones and Lamson automatic. The bored ring is then placed on the fixture shown in Fig. 9, which is also of the expansion chuck type.

The construction of the fixture is obvious from the illustration and it can be readily seen that as the screw shown at the upper part of the fixture is screwed down, the centre section or plug of the fixture is also forced down. As the plug is made taper the action of forcing it down pushes outward the split section, thus gripping and holding the ring securely.

The outside of the ring is then turned and the bevelled surface produced by two separate tools held in different turret positions.

The stitch ring shown in the half-tone illustrates it as it appears after these operations have been performed.

Machining Ring Gear Blanks

On the hosiery machine quite a number of gears are used, some of these are spur and others bevel.

The illustration, Fig. 10, shows the machining of a large bevel gear, previous to cutting the teeth known as the ring gear blank.

The casting is held on an expansion chuck fixture, gripping the part by a large diameter recess. The piece is held against a faced boss of the fixture, and the operator, by tightening the screw shown at the outer end of the fixture, expands the split section of the chuck, thus holding the casting firmly in position. It might be added that this type of chuck not only holds the part, but also centralizes it in the operation.

The centre hole is then bored to 3 in. diameter to a plug gauge, a recess is also machined, the flange faced and the outside turned to the correct diameter.

The half-tone shows part of one of the finished machined blanks resting against the face plate of the machine.

Note might be called to the rather interesting type of tool used for the facing operation and shown immediately in front of the turret. This is made with a circular bar, held in the rectangular bar, which is fastened in the turret proper.

This bar is made with a head in which a short piece of high speed steel is held by means of a setscrew in front.

When the operator desires to tip the tool in any direction to provide clearance for the cutting edge of the tool, the circular bar is revolved, and by tightening the large square-headed setscrew, shown threaded in the rectangular bar holder, the bar is held rigidly in position for the machining operation. This type of tool is found to be very serviceable, and as can be readily seen, is also cheap in construction.

The cam plate is a somewhat slender casting and must be held rigidly, so that the various machining operations produce a part absolutely true to shape.

Machining the Cam Plate

The fixture used for the first of these operations is shown at Fig. 11.

This tool is made with a contour similar to the cam plate, but slightly larger in outline. The piece is then dropped into the fixture and the six clamps tightened against the edge of the flange.

The three clamps at the rear of the fixture are rigid, or fixed, and determine the correct location for the piece. The three clamps shown, two on the front side and the one at the right being tightened against the casting, force it back against the first three clamps noted, thus locating as well as holding the element securely in position. The machining operation is performed on a two-spindle Jones and Lamson automatic, similar to that shown in Fig. 7.

The two fixtures used on the machine are held and located on the face plate in a manner similar to that previously described.

The large hole in each casting is then bored to a plug gauge and the entire outside surface of the flange faced with a smooth finish.

The casting shown in the fixture is one after these operations have been performed. Note might be called to one feature in the construction of the fixture, namely, the inserted hardened tool steel blocks A, which bear against the casting.

This construction is cheaper than if the entire strap had been made of tool steel, the rest of the strap being of a low carbon steel ,and a further advantage is the comparative small cost of furnishing a new part for repairs, should it at any time be found necessary.

In the next section will be shown other tools, some of a multiple type, used on Jones and Lamson automatics.

Caustic Soda

There is only one safe and speedy method of handling caustic soda as received in iron drums. Punch two holes in the lid of an unopened drum, place the drum in a tank, cask or convenient receptacle. Send a steam jet by a pipe into one hole and open the valves. It is possible by this kink to make up 30 per cent. solution speedily and safely. To dilute is a simple matter and to duplicate strength a hydrometer is the easiest method. The weight of caustic being known and the capacity of receptacle the amount of alkali per gallon of solution is easily ascertained. The hydrometer used was graduated 1,000-1,200 and as the purpose in view involved very great dilution (about ½ per cent. being found sufficient) the solution was made up 1,200 in strength; a small measured quantity of the strong liquor being placed in a much larger measured quantity of water. Alkali, like all forms of grease, being now expensive and difficult to procure, it is thought that caustic can be substituted for milder alkali, such as soda ash, if the proper means of handling and using are set forth. As a grease shifter caustic is ideal, but it needs care and proper handling, otherwise injury may result to the experimenter unversed in its nature. A foot with strong boiling caustic liquor spilled over means painful burns and ruined foot-gear, while a spot or two drills holes in any woollen clothing; its action on wool is extraordinary and must be experienced to be credited.

RETARDING THE SETTING OF PLASTER OF PARIS

In the making up of plaster of paterns, the plaster of Paris sets too quickly for much to be done with it where water alone is used for mixing. For this reason, vinegar, or vinegar and water, should be used instead of water, the vinegar retarding the setting. Roughly, plaster mixed with all vinegar takes six hours to set, and with equal parts of water and vinegar just over two hours, the state of the plaster having something to do with the actual time taken. Usually, however, three parts water and one part vinegar gives sufficient retardation, but as the vinegar is increased so is the retardation.—M.E.

Technical Education Plus "Horse Sense"

A Short Article, Illustrating That Technical Education is Not Everything, But That Shop Experience is Also Necessary to the Machine Tool Designer

By ROBERT MAWSON

If I do not lay emphasis in this article to further personal education. A man either in the shop or office, should have the habit.

Get all the technical knowledge you can but with the increasing pressure you can put it to practical use whether it is obtained at a college or by learning the intelligent way.

My remarks are to encourage and the idea often held by young engineers, who in shop and office that the gaining of a technical education is the end of knowledge.

This is not so. It is only the means to an end, and as there is often useful an intuitive mechanic who has been designated with experience and "horse sense." One of my assistants whom I have under my notice will put these qualities the same before five and other method.

I was once at a good salary. I remember with that monthly letter of notice and hade.

This machine looking from the work to my then boss, one of good deportment. I remember following an interesting article which appeared on Here was encouraging. Before observed that the foreman was hardly finished in "doing nothing." This was in the "dark ages" of the lathe. In that part of the machine were required for the change gears and shifting mechanism, which a good lathe, but most have had the shifting parts also were not included. This was long too large. With the machine there is now necessary to change the speed of about a hundred feet of feed at the regards to lubrication and for the gears to get under the box change gear needs from the floor to the most part of the time.

It is easy to think here the unreasonable idea was used being on on the line the machine in the shop had used with to the work for the group of years.

This could have been overcome if the foreman [illegible] a book to the work getting to personal touch with the machine and have a little "horse sense."

A second example was a certain machine that which was designed to a certain time that had thereof with a mechanical interpretation. In other words, he had never worked or spent any time in the shop.

On this machine the various gearing and feeds were controlled by push rods and by levers at the head end of the machine, which one of the foremen tries. There was much talked about an action from the front and operator that the hand by the left end of the machine a distance of about two feet. The original had carefully figured out the distance so there was not much lost motion but only with strong enough.

I have to count they were of ample strength to perform the function of shifting the gears, but if anyone has used an operated shifted gears he is aware, and when it is remembered that these machines is operated continuously for one or two years the saving would be important.

And the actual[illegible] [illegible] by a very small time the rods were bent and twisted, and their constant removal of shifting parts could not be tolerated.

The rods were later reduced to one of ample size so that any possibility of distortion was removed.

Here then was another and more "horse sense" combined with technical training would have prevented a foolish mistake.

The third example I will deal with is a way of designing a machine detail. The part was a cover or housing for a countershaft. Four bearings were required, together the distances of centre and these had to accommodate driven gears of various sizes.

The designer figured out the [illegible] and the casting with a number of bosses to suit these and considered that the cover could be attached to the headstock wheel.

The correct dimension of the cover was approximately as follows.

I need hardly say that this was not the correct method to adopt. It will not be known the cutters of any one to be supported [illegible] to a machine [illegible] arrangement.

The design was therefore passed and the shop made drawings of these machines could be obtained with a reasonable amount of [illegible] [illegible] [illegible]

JUDGING STEEL

By M. Mark

In many factories there is a certain amount of carelessness in keeping steel stock. Labelled steel is sometimes kept in a damp place where the labels drop off, and where it is the custom to mark the quality of steel bars by painting in different colors it is an easy matter for mistakes to occur. An instance has been cited where seven grades of steel were painted in the same color. A workman consequently is often called upon to judge steel quality for himself, and as a general thing he goes by the general shape of the material, the appearance of its surface, the way in which it fractures, its weight, and "ring" when dropped, its smell, or his intuitive knowledge. At times, these fail him, and he goes by the spark, service and fire and water tests, as he calls them. If the workman possesses a high degree of skill, he can determine quality by any of these to a surprising degree of accuracy, and in regard to tool steel he seldom makes a mistake, going, as he generally does, by the appearance of the surface. It is fairly good evidence to him if the bars have a good, smooth surface, and the corners are sharp and clean. He also goes a good deal by the general shape of the stock; screw stock is always of hexagon section and octagon section steel generally means suitability for cold chisels and similar tools. As a matter of fact, smooth surfaces and sharp corners indicate work at low temperatures, whilst rough surfaces and round corners are caused by an iron oxide scale when the metal is laid down at high temperature, so that the appearance of the steel stock is not an invariable indication as to either its composition or its quality. According to this authority, however, many workmen are not prone to judge entirely by appearances. They prefer to drop the metal on a hard floor or on a heavy piece of iron. If the ring is of a sharp, clear tone it usually indicates to them that the metal is of good quality. The finer the grain the more homogeneous the structure and the harder the metal the sharper is the note given when falling. These qualities are developed by elements in the metal by working and by heat treating at a moderately low temperature. On the other hand, wrought iron will emit a dull tone owing to the presence of about 2 per cent. of slag, and the usual methods of working such metal at a high temperature. This method is not reliable or dependable because work and heat treatment will affect the tones emitted when the material is struck or dropped.

It is surprising how many expert workmen will select metal by intuition; and because of their opinion they work the tool into shape regardless of any indication in its cutting properties that the metal may be undesirable. Their mistake is usually discovered when attempting to harden the metal or when putting it into service. It is said that in one of the American manufacturing districts it is the custom for a man to nick a bar of stock with a cold chisel, break it in two and immediately smell the fracture, claiming that a good quality of steel smells like ammonia. There is no ammonia in steel, and many of the tests used by the workmen are just as unreliable.

The fracture test does not represent the true quality of metal, but rather indicates the last heating operation to which the metal was subjected. A fracture that has a coarse granular appearance may not mean that the steel is of inferior quality but that it was laid down at a high heat, and that the crystals retained the size corresponding to that heat. There are exceptions to this rule however, for many of the elements in alloy steels prevent or retard crystalization at high temperature. High-grade steel shows an unusually fine grain after being heated to a temperature of 2,250 deg. Fahr.; on the other hand, carbon tool steel heated to its critical temperature and immediately quenched shows a fine silky structure, and it is doubtful if the average mechanic is able to distinguish these metals when they are placed together for comparison. If a small piece of carbon tool steel is heated to just above its critical temperature, about 1,450 degrees Fahr., known as a dark cherry red and immediately quenched in water, it will be hard enough to resist a sharp file, and when fractured should show a fine silky structure. If a low or inferior grade of carbon steel is treated in this manner the surface may be hard enough to resist a file, but the fracture will not show a fine structure.

Many workmen, as well as the experimental engineer, select available material at hand without any determination as to quality, and then put expensive labor upon the part or tool. When finished, it will be tried out in service and if it fails something else is tried. Such failures are usually found on the scrap heap. The service test, however, has its advantages if the engineer has a knowledge of the material thus tested. This information is invaluable as it is the combination of successes and failures that gives the empirical knowledge that completes the perfect understanding of theory. The scrap heap of failures is the most instructive place about a factory.

The spark method of test is based on the action of oxygen of the air on the combustible element present in iron and in many of the alloying elements contained in the different steels which acts explosively when heated to a temperature necessary for combustion. To produce bright sparks as a result of heating finely-divided particles of metal the heat must be intense, at any rate sufficiently so as to enable the particles of metal and the oxygen of the air to combine chemically to cause complete combustion.

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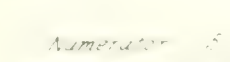
Shop Arithmetic—Underlying Principles

The Second of a Series in Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of Fractions

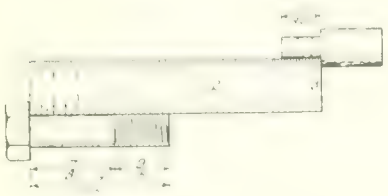
By J. H. RODGERS

In what has gone before units or whole numbers only have been dealt with, but it is very often necessary to consider things in a lesser value than a single unit, in which case we must have some system of sub-division. Two methods are in general use for this purpose—fractions and decimals—sometimes called vulgar and decimal fractions. It is seldom that machine-shop dimensions will call for even inches, feet, etc.; therefore it is necessary to have graduations on the measuring instruments that will provide for the accurate determination of distances smaller than the unit under consideration. The ordinary units of linear measurement in this country are miles, yards, feet and inches; sub-divisions of the higher values are usually made by reducing to a lower term, or by the common fractions of ½, ¼, ⅛, 1-16, 1-32, etc., although dimensions of any desired value may be used to meet the specific requirements.

A fraction is one or more of the parts into which a unit is divided and is composed of two terms: the lower (denominator 32) denoting the number of parts into which the unit is divided, and the upper (numerator 5) indicating the number of these parts that are to be taken, the value of the fraction being expressed as:



The common steel scales used in the machine shop are generally divided as stated above, and a little practice will teach more than a page of explanation. The sketch here shown will illustrate the fractional application of the unit division:



The rule in this particular instance has graduations of 16 to the inch on the lower side and 32 to the inch on the upper [illegible] length of the bolt is seen to be one full inch, and 9 of the 16 divisions of the second inch, indicating that the total length of bolt, below the head, to be 1 9-16 inches. The same process is followed in the case of the small stud, where the length of the short end is shown to be 13-32 inch.

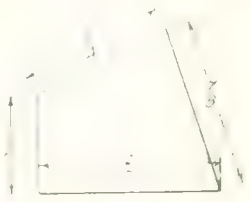
In working out questions where fractions are involved it is always advisable to keep them as simple and in terms as low as possible. A fraction does not alter its value if both terms are multiplied or divided by the same number; for instance, ½ is equal to 2-4, 3-6, 4-8, 16-32, etc., but the simplest form ½ would invariably be used. Fractions are so common in every form of calculations that a knowledge of their use and application is essential to the figuring out of many shop problems. Accurately speaking, there is only one form of fraction, called a proper fraction, in which the denominator is greater than the numerator, but the term—improper fraction—is often used where the numerator is greater than the denominator. This, however, is not really a fraction, but the method of combining a whole number with a fraction or part of a unit for the purpose of convenience, as the final equation of an improper fraction is that of a mixed number, the integer portion and the fraction, the latter being a definite part of one of the units of which the number is composed.

For instance, in the rectangle here shown, the length of the sides are 1⅝ inches, and the width of the ends ⅝ of [illegible]

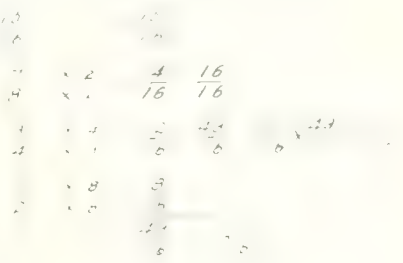
The distance around the edge would be:

It is readily seen that the improper fraction is the outcome of the addition of the four proper fractions, but the result is rather confusing. This, then, must be changed to a simpler form: a unit would be $\frac{8}{8}$, so that it is seen that in $\frac{20}{8}$ there are two units and $\frac{4}{8}$ over, but as $\frac{4}{8}$ is equal to $\frac{1}{2}$ the value of the improper fraction $\frac{20}{8}$ equals $2\frac{1}{2}$, and this, added to the previous whole number, gives the correct result as 4½ inches.

It is often much more difficult to work with fractions than with whole numbers owing to their varying denominations. In the addition and subtraction of fractions it is generally necessary to reduce the expression of one or more to a common denominator before the work can be properly performed. Suppose in the irregular figure here shown the length of the sides are as illustrated; what would be the distance around?



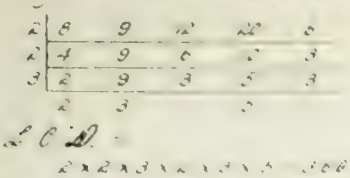
It is necessary to add together the four dimensions. To do this they must be changed to fractions of corresponding denominations. It has previously been stated that a fraction can be changed to a higher or lower denomination without changing its relative value by multiplying both terms by the same number; then the above question can be solved by bringing all the fractions to a common denominator, and a glance will show that 16 will be common to all, therefore:



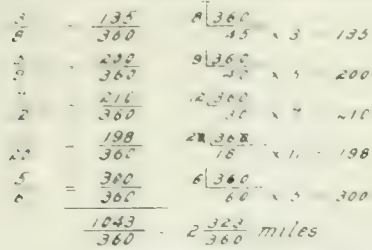
However, it is not always that fractions will come where the common denominator can be so easily determined. For instance, several sections of track have been laid, the distances being:

and it is desired to know the entire mileage laid. A common denominator could be found by simply multiplying all the denominators together and converting the various fractions to that denomination. This, however, would entail much unnecessary figuring, so that the method of finding the least common denominator is more generally resorted to. To do this the denominators are placed in a row and divided separately by the lowest prime numbers, carrying down those numbers that cannot be divided evenly until the final numbers are prime numbers. The product of these divisors and final remainders will be the least common denominator (L. C. M.)

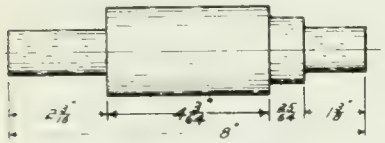
For the above question we have:

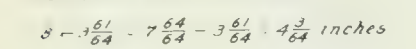


To add the various fractions they are converted to a similar value, but with the denominator 360 common to all. This is done by dividing 360 by the denominator of the fraction and multiplying the result by the numerator of the fraction for a new numerator. Add the various numerators and reduce to a mixed number with the fraction in the lowest terms.

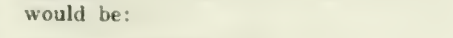


The subtraction of fractions calls for a similar process as that explained for addition, the denominator being the same before the work is performed. A shaft 8 inches overall has one end turned down to 2 3-16 inches in length, and the other end has two steps of 1⅜ and 25-64 inch long; what is the length of the middle portion?

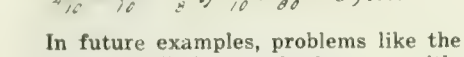




It is probable that the multiplication and division of fractions will be required to a very great extent in the solution of many shop problems, so that a knowledge of their application is very necessary. When multiplying fractions the answer is obtained by multiplying the numerators together and likewise the denominators. When mixed numbers are involved it is well to change them into improper fractions. To find the circumference of a pulley or any circular object, the diameter is multiplied by the constant 3 1-7—this being the ratio of circumference of any circle to its diameter. A wheel 15 inches in diameter would be:

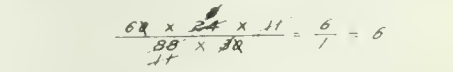


A shaft 4 8-10 feet long requires ⅝ of it cut off; how long is the piece?



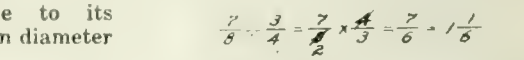
In future examples, problems like the following will frequently be met with, so it is good practice to become familiar with the method.

In the above solution the multiplication has been carried out in detail, but this is seldom the practice in the actual working out of a problem. Cancellation is invariably used as it shortens the work considerably and likewise reduces the possibility of error. Cancellation is the process of elimination of such factors as are common to both numerator and denominator. A factor is one of the even divisions of a number; 4 is a factor of 8, 12, 16, etc.; 7 is a factor of 14, 21, 28, etc. To clearly illustrate the use and advantage of cancellation, take the above problem:

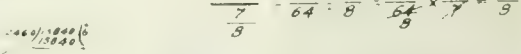


Ten is common to both 60 and 30; 3 is common to both 3 and 24; 8 is common to 8 and 88; 11 is common to both numerator and denominator, leaving 6 on the top and 1 on the bottom, or an answer of 6, the same as in the previous case.

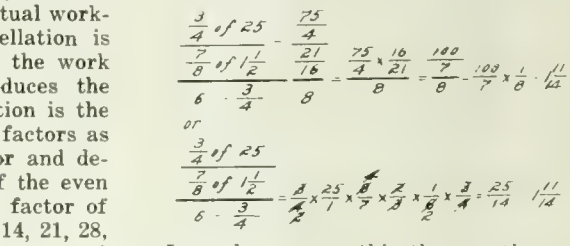
Divisions of fractions like that of whole numbers is the reverse of multiplication, and from this we learn the fact that to perform the operation of division, all we require to do is to invert the divisor and proceed as in multiplication, thus:



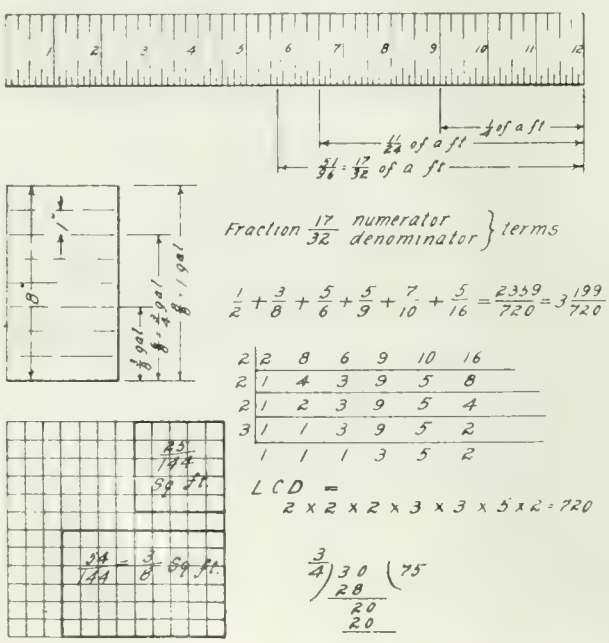
In many formulae the expression is often made in the nature of a compound fraction but the operation can be simplified by applying the same rule as is done in common fractions by remembering that the numerator is always divided by the denominator. For example, in the problem below, the arrangement can be altered to conform with the simple method.



It occasionally happens that complex problems will be met with like that below, and the same process of conversion is followed, thus:



In such cases as this the question resolves itself into a number of simple fractions, the main division line being indicated by additional thickness. This means that all the work above the heavy line is to be divided by all that comes below. Further explanation of practical problems like this will be given later in the course.



A *fraction* is one or more of the parts into which a unit is divided.

The *terms* are the *numerator* and the *denominator*.

To find the *L.C.D.*—Place the denominators in a row and divide by prime numbers until the remainders are prime numbers. The product of the divisors and the remainders will be the L.C.D.

To *reduce* a fraction to its *lowest terms*—divide each term by the same number.

A fraction does not alter its value if both terms are divided or multiplied by the same number.

To *change* a fraction to a decimal—divide the numerator by the denominator.

The Bessemer Process of Steel Manufacture

How Steel is Actually Made in the Bessemer Mill—The Story Told in Such a Way as the Stranger to the Steel Mill Can Understand

By P. S. Case

A FEW weeks ago "CANADIAN MACHINERY" published the first of a series of articles by P. S. Case who edits "The Dragon," published by the Fafnir Bearing Co. Mr. Case was formerly metallurgist in the Bessemer mill of the Lackawanna Steel Co.

Synopsis of Fifth Chapter.

In Chapter I of this article, which was printed in the last issue of "The Dragon," we observed: (1) that practically speaking, the manufacture of steel is a refining process, in which the excess of impurities such as carbon, silicon and manganese, are removed from the pig iron; (2) that in the Bessemer Process these impurities are "burned" out of the pig iron by means of an air blast; (3) that the "burning" or oxidizing, combining the carbon, etc., of these impurities is very rapid and generates all of the heat necessary for the process; (4) since the volume of the impurities thus burned being lighter than metallic iron, they form a layer or slag on the surface of the metal from which they are subsequently separated; and finally, (5) as the chemically principally pure iron, containing only the original phosphorus and sulphur, and traces of other chemicals which is left, the proper amounts of carbon, silicon and manganese are added to impart to the finished steel the desired percentages of these elements.

Making Steel

When a blast furnace which is supplying the Bessemer with the necessities of life [illegible] Bessemer. There is invariably quite a supply on the "Bessemer" when the time for blast begins. The heat is usually "split up" the usual Bessemer and retain the necessary percentages of carbon, silicon and sulphur contained in the metal. This necessary is based on the appearance of the fracture surface of a metal sample taken off with cold and quickly chilled and is therefore very approximate. If the anticipated percentages are within the necessary limits the [illegible] of the Bessemer engineer "turns it in the steel." Otherwise, to which the blast furnace foreman is used to assent to the laboratory. No information of the exact point which these conditions are reached can be had from the fact that a sample can be cast in the laboratory and a report given. The blast furnace foreman is used to assent to the laboratory.

In the meantime [illegible] the ladle foreman notices that the slag level must be low "enough" otherwise, as [illegible] must be the "pig condition" necessary to [illegible] "slag" [illegible] of slag is "correct" [illegible] a large round furnace for [illegible] to 25 tons of pieces of pig iron, and is used to melt the metal from the [illegible] is poured at the blast furnace until it is ready for the converter. Furthermore, the cupola operator [illegible] a quantity of metal that is greater than [illegible] is at a sufficiently high temperature to prevent the [illegible] condition. Occasionally [illegible] to be used to [illegible] [illegible] of the heat's of metal in the cupola [illegible] to prevent possible [illegible] the cupola is charged by loading a [illegible] pieces which [illegible] from a [illegible]. In addition to the [illegible] as the heat requires. The metal passes into a [illegible] a pattern under the platform of charging floor, [illegible] are not quite adequate. It is one of the duties of the [illegible] to keep account of the average chemical composition of the pig iron in the [illegible] that allowance [illegible] for admission of scrap, and for [illegible] of [illegible]. This is of great importance to the "blower" [illegible] is given him as indication of the amounts of the various [illegible] contained in the pig iron.

At Lackawanna there were two of these mixers which are located at a high elevation in the mill. A locomotive pushes the [illegible] having the ladles of iron into position below the mixers. The drivers of [illegible] the ladles are raised up by [illegible] above. The [illegible] of the mixers are where their contents are poured. It is of considerable importance [illegible] that the iron is poured. The purpose being to keep the temperature of the contents as evenly balanced as possible and the variation in the [illegible] [illegible]

Whenever [illegible] a cup of [illegible] [illegible] to the mill. Neither [illegible] is frequently called [illegible] and it can be seen [illegible] to [illegible] [illegible] [illegible] to [illegible] to [illegible] [illegible] [illegible]

a new bottom, it is pushed on a low truck directly under the vessel and raised into place by means of a hydraulic press. A layer of clay is placed around the rim of the bottom which, when compressed, makes a tight joint. Occasionally, it becomes necessary to reline the entire vessel, which involves considerable delay, since the vessel must first be allowed to cool off sufficiently to permit men to get inside of it and break up the remains of the old lining with sledges. This is about as hard and as hot a job as one can imagine, and one in which a man certainly earns his pay envelope—this work has no place in a mixer-foreman's life!

Now let us resume the story. One of the vessels has been revolved into an horizontal position, and is ready to receive the charge of pig iron which has just been poured from the mixer into a transfer ladle. With a great deal of puffing, a dinky engine pushes the ladle of iron from the mixer through the mill, coming to a stop directly in front of the white hot cavern formed by the vessel's yawning mouth. Moreover, the locomotive might just as well be run automatically, since I found one night, as I jumped from the track in the nick of time, that the engineer wasn't worrying about obstructions on the "right of way." Afterward, I was calmly told that that engine already had two "notches" on its bumper. The contents of the ladle are then charged into the vessel by a crane man who drops a hook into an eye on the far side of the ladle and tilts it by hoisting with the crane.

Next the blast is turned on while the vessel is still in an horizontal position, and the deluge of sparks and flame which shoots across the entire width of the mill creates quite a spectacle for the uninitiated and spells woe for him who is caught napping—I remember once having seen a Pole, who had a tremendous shock of curly blonde hair, run to cover when a few stray globules of molten metal landed on his mattress-like head of hair. Finally, the vessel is revolved into a vertical position, and the "blow" is on.

It is interesting to know why the vessel is charged while lying flat. This is essential in order to prevent the molten metal from running into the tuyere openings in the bottom and freezing. By "lowering" the vessel, the metal is contained in the deep belly or side of the converter and does not come into contact with the tuyeres until after the blast is turned on. Then it doesn't matter, because the air pressure is sufficient to sustain the column of metal. The vessel is then revolved into a vertical position, as stated above.

The operation of the vessels, as well as the entire "blow," is controlled by the "blower," who is usually a man who has literally grown up in the mill. So much depends upon his skill and judgment that it is scarcely too much to say that he is the man who "makes" the steel. The blower and his several assistants are stationed on a platform, called the "stage," which is situated on the opposite side of the mill at a point directly in front of the vessels. On either side of the blower, there are a number of long levers, by means of which his assistants manipulate the vessels, raising and lowering each at the beginning and end, respectively, of the blow. Furthermore, the blower has a large chart in front of him, called the "blow sheet," on which he keeps a complete record of the blows. This is essential, since there are often three and sometimes four vessels in operation at once. Moreover, it may be that soft steel (low in carbon) is being made in one or two vessels and high carbon steel in the others.

The sequence of chemical reactions which occur with startling rapidity inside of the vessel, as well as the visible phenomena attending them, are both interesting and complicated. It is through observing these phenomena that the blower is enabled to distinguish each successive stage of the process. Moreover, the consummate skill exercised by the blower in controlling and regulating the blow from beginning to end is little less than uncanny, and is acquired only as the result of years of experience combined with exceptional aptitude for the work. In fact, the entire process hinges on the blower. However, more about this interesting personality, as well as a description of the blow, will be reserved for the succeeding instalment of the story.

Current Events in Photograph

The photo shows one of the British "K" class submarines, the largest underseas boats in the world. This one, which is 350 feet long, ran ashore in a fog on the coast of Lancashire. It was refloated and proceeded on its way undamaged next day. This type of boat, it will be noticed, carries a four-inch gun fore and aft as well as an anti-aircraft gun amidships.

WHAT OUR READERS THINK AND DO

Clear and Opinionated Reporting on Interesting Developments, Daring Inventions, Ideas and Ideals That Are Finding Expression Among Readers

CONVERTING THE SMALL LATHE

By A. HAMMITT

To make a boring tool, from an old saw blade, instead of the usual method, has the following advantages: the tool can be made in a few minutes, and when finished is as good as new. Also, the tool can be made to any desired shape, and will not require grinding after it is made. Another advantage is that the tool can be made from a piece of steel that is too small to be used in the ordinary way.

The tool is made from a piece of steel that is about 1/4 inch square and 3 inches long. The end of the tool is then ground to a point, and the sides are ground to a taper. The tool is then hardened and tempered. The tool is then ready for use.

To make the tool, first cut off a piece of steel that is about 3 inches long. Then grind the end to a point, and the sides to a taper. The tool is then hardened and tempered. The tool is then ready for use.

CHUCK FOR TOOL POST OF LATHE

By [illegible]

DRAFTING ROOM KINK

By J. H. M.

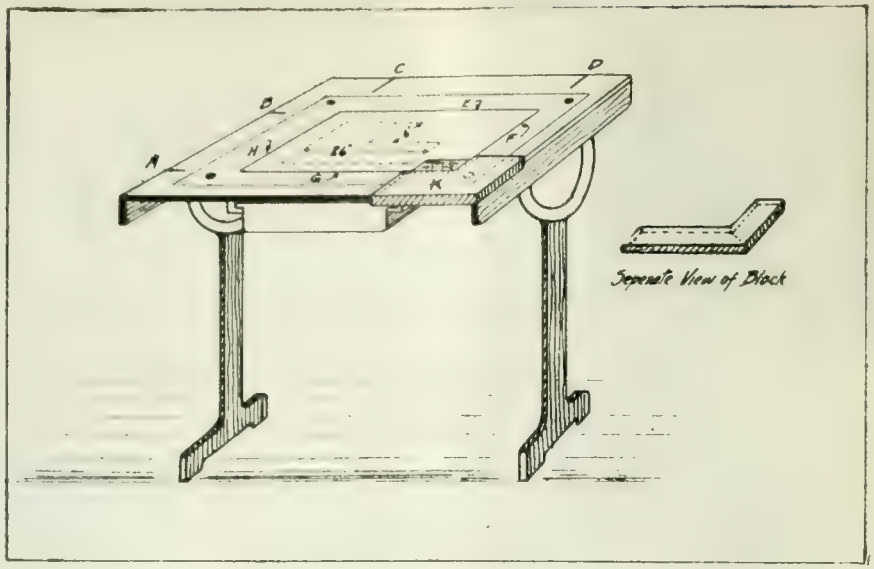
The following idea, as illustrated on sketch accompanying this article, will be of interest to the meek and lowly draftsman in particular. Any scheme to aid him in his daily grind, should be appreciated, so in this spirit the article is proceeded with.

Referring to sketch, the lines A, B, C, D, are the first noticed, so these are explained to start with. Depending on the size of sheet as adopted by the drawing office, these lines are marked permanently and plainly on the board. In this way no measuring of border lines is necessary. Simply project from these lines, the result being the border lines E, F, G, and H.

Last, but not least, comes the block K. This block is shown on separate view to the right of general view, and denotes shape plainly.

Resting the block, against the lower right-hand corners of the board, we can now place the stamp pad against the inside edges and be assured that not only is the stamp in its proper place, but it will be square with the border lines.

Another advantage the writer has found is that by this plan, he is assured of always working at the same relative position on the board, and as this position is comparatively near the bottom, no undue pressure against his body and the board are necessary to reach his work. On the sketch shown, the sheet in use was 18 x 30-in., a very convenient size in use at present in quite a few drafting offices.



DRAFTING ROOM KINK

LATHE DOG FOR FINE WORK

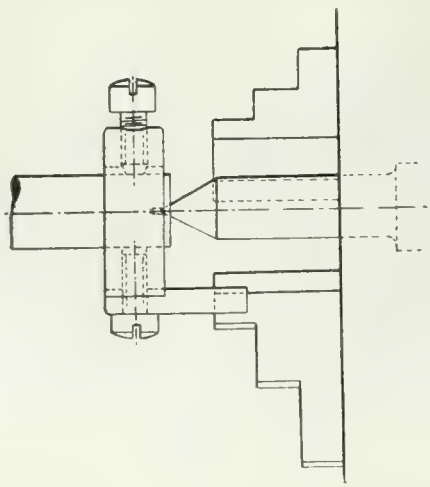
LATHE DOG FOR FINE WORK

A DOG for driving delicate work may be conveniently made of hardwood as shown herewith. It is clamped on the work by a split and a screw with nut sunk into the wood. Such a dog does no harm to the work, however delicate (such as tubing or plated pieces), and can be cheaply made.—FRED HORNER.

WASTED FUEL IN FACTORIES

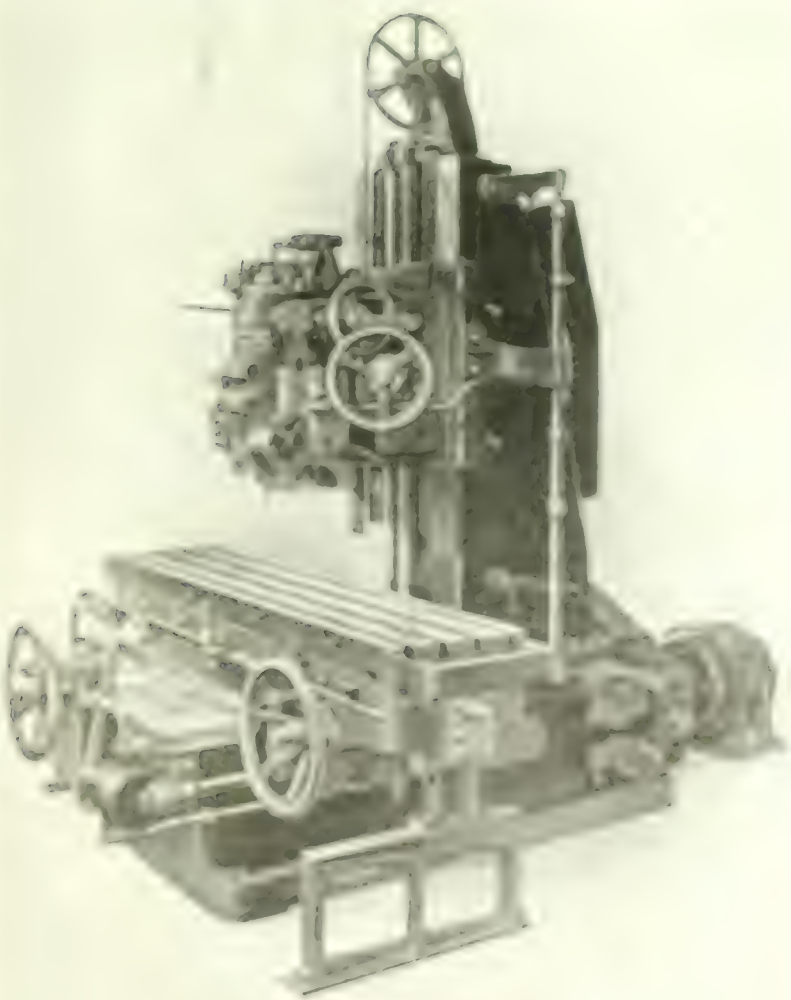
In most factories the ashes and waste from boiler and other furnaces carrying a variable amount of usable fuel is either taken to a common dump, or is carted away without any attempt at recovering the useful parts, sifting even not often being done. In this way loss of fuel occurs, and it would seem that there is room for treatment of both factory and domestic fuel wastes. Probably a combination of dry and wet separation would give the best results, the material being graded and to some extent separated dry by means of revolving screws as in a coal washery, and afterwards separated in wet jigging or other machines so far as the heavy waste is concerned, the light stuff, metals, and other material over perhaps rejections from a 2 in. mesh screeen being hand sorted. Fine stuff below that passing a ¼ in. mesh screen could also be left untreated, and the result of treating the grades between the ¼ in. and 2 in. would be fuel and waste.—M.M.

LENGTHENED CENTRE FOR EMERGENCY WORK



IN using a lathe for general work and odd jobs where changes of chucking are frequent, the hint given in the accompanying sketch is of use. The idea consists of being able to do centre work without having to remove the jaw chuck, as the work may only last for a minute or so, a job of reduction, chamfering, grooving, filing, polishing, etc. In place of the ordinary centre, another is made with a lengthened end, to reach just outside the jaws, so that a carrier or a driving collar can be accommodated and driven from the chuck jaw.—FRED HORNER.

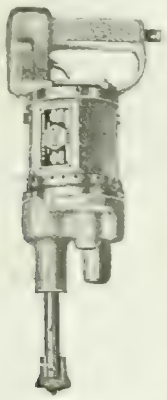
DEVELOPMENTS IN SHOP EQUIPMENT



travel, 18 in.; longitudinal travel, 56 in.; working surface of table, 18 in. x 72 in.; net weight of machine (approximately, 12,000 pounds.

NEW BLACK AND DECKER ELECTRIC VALVE GRINDER

The electric valve grinder illustrated is a new tool made by the Black & Decker Mfg. Company, Baltimore, Md., which is of rather unusual design and construction. It is an electric motor driven device with an oscillating spindle and supplants the old laborious method of valve grinding by hand. The spindle oscillates with a long steady sweep similar to the movement obtained in grinding by hand, but many times more rapidly. The patented Black and Decker "Pistol Grip and Trigger Switch" is embodied, making it possible to operate and



ELECTRICALLY DRIVEN VALVE GRINDER

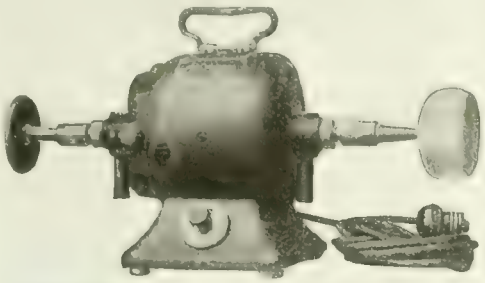
control this grinder in an unusually convenient manner. A 1-6 H. P. motor is used which is air cooled. It operates on standard power circuits either alternating current with range 25 to 60 cycles or direct current, being made for circuits of 110 volts, 220 volts and 32 volts.

The motor and gearing with reciprocating mechanism are completely enclosed in an aluminum housing, the gearing and oscillating movement being separated from the motor compartment and packed in grease. The grinding spindle runs in a ball thrust bearing. Armature shaft runs on Norma ball bearings and gears are mounted on shafts ground to size supported at both ends in long phosphor bronze bushings. Bits are provided to make the tool adaptable to various types of valves.

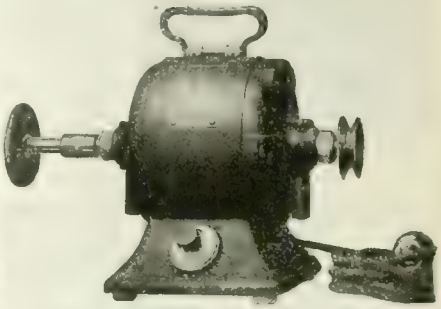
POLISHING AND GRINDING MOTORS

The accompanying illustrations show a recent development in polishing and grinding motors brought out by the Westinghouse Co. The adaptability of this machine to industrial uses is very apparent. The various chucks, wheels, drills and pulleys adapt the motor to grinding, polishing, drilling, etc.

The motor used is simple, powerful and quiet running, and the single speed feature eliminates the complications of multispeed motors and results in a simpler, more rigid and less expensive motor. A handle is provided for carrying; the motor is totally enclosed and is provided with extra long dust-proof bearings. End play is negligible. A properly designed, broad and substantial base provides stable mounting. Rubber



GRINDING AND POLISHING MOTOR WITH



GRINDING AND POLISHING MOTOR PULLEY

cushions or bumpers in the base permit mounting the motor on any surface without marring. Screw holes are provided for fastening permanently in position.

The motor is furnished with a conveniently located snap switch and 10 ft. of flexible cord.

FERRO-MOLYBDENUM

The use of molybdenum in steel manufacture on a large scale may be said to be a product of war conditions. Its action is in the main similar to that of tungsten, which makes steel self-harden ing. Its ores are widely distributed but are not very plentiful. The scarcity of tungsten, particularly in Europe, and urgent war demand, have led to the manufacture of ferro-molybdenum on a relatively large scale. Its use is so recent that very little has been made known concerning it. It is said that the large German guns which bombarded Liege were lined with molybdenum steel to increase their resistance to erosion. Parts of guns, gun carriages, motors, and automobiles are also being made of molybdenum steel of excellent quality. Canada has been especially active in the manufacture of ferro-molybdenum steel, most of which is exported to Europe. Germany drew considerable supplies of molybdenite from Norway to compensate the shortage of tungsten for high-speed tool steel.—M.E.

WORKSHOP MEASUREMENTS

Accurate measurements in engineering workshops has assumed special importance now that standardization has been so largely adopted. It is absolutely necessary to ensure rapidity of production and perfect interchange ability.

The "limit" system of workshop measurement, which is quite as suitable for ordinary workshop use as it is useful in repetition manufacture. As an illustration of its adaptability to present industrial needs, it has been successfully adapted in the Manchester district, where a number of firms are collaborating in the manufacture of the same type of engine. All the parts required to be interchangeable are made to limits, and so well is the work executed that parts can be taken from any works and fitted to parts made at any other one with a minimum of fitting. This is, of course, the essence of the manufacturing system, and the advertising value of spare parts sent out which require no fitting is extremely great. The Weir feed pump is one of the striking examples of early interchangeable work, and its success is largely due to this feature. In connection with the "limit" system the terms "allowance" and "tolerance" are still sometimes confused. The tolerance is governed by the setting of the high and low limits of the snap gauge for shafts, or the "go" and "not go" ends of a plug gauge for holes. The allowance, on the other hand, is controlled by the difference between the settings of the snap and plug gauges.—M.E.

RETAINING KEYS IN PLACE

Where a wheel, lever or the like has to transmit a load, or power, in first one direction and then the reverse, some precaution should be taken to prevent the key, securing it to the shaft, from slacking back due to this back and forward motion. There are various methods of doing this. The first method is simple and effective, but cannot be considered a first-class job; there are, however, situations where it is a most practical way of overcoming trouble, and is brought about by slightly punching in the top edges of keyway close to head of key. In the second method a hole is drilled through the shaft and a bolt fitted, the head being made to fit in keyway; to prevent the nut working loose the end of the bolt can be slightly pressed over or the nut done away with altogether and a split pin substituted. Again instead of a bolt, the hole can be a tapped one and have a set screw fitted. Where the gib head comes flush with the end of the shaft the third method can be used, a hole drilled and tapped in end of shaft and a set screw and washer fitted. Where the head of the key overlaps the end of shaft, the manner of retention is practically the same as the third method, the underside of head being slotted in the fourth method, to allow for the insertion of the keep washer. Where any screwed part is used vibration of the shaft must be taken into account and guarded against. —M.E.

Study Mechanical Drawing With Us

HOW many apprentices, yes or even machinists, can intelligently read a mechanical drawing, understanding the principles involved?

As a well known tool designer once remarked: "I actually noticed an apprentice looking at my favorite drawing upside down, and very much troubled to think that he could not readily grasp its details."

While perhaps this is an exceptional case, it is a well-known fact that the subject of Mechanical Drawing has not been gone into as it should have been, so CANADIAN MACHINERY intend to, as far as lies within their power, remedy this state of affairs.

Commencing the first issue in April, CANADIAN MACHINERY will begin the publication of a series of articles on "Mechanical Drawing," and will continue this series every two weeks.

This series will commence at the very beginning. It will aim to start at the point where a person with an ordinary public school education can follow all problems, or plates as shown throughout the course.

All readers, from the apprentice up, can carry on this course. Such an opportunity does not occur every day. CANADIAN MACHINERY is going to considerable trouble and expense to prepare this series, knowing that their readers will be vitally interested.

To make the series of special value to readers, CANADIAN MACHINERY will offer a prize each issue for the best plate worked by their editors. These prizes will be awarded for general neatness and close following of the subject, whatever it may be. These prizes will be in the shape of a special 4-inch steel rule, set into it which is the regular rule divided into fifths together with a complete list of tap sizes of the U.S. standard, the S.A.E. standard and the Briggs pipe thread all being engraved plainly on the rule. On the reverse side of rule one edge is divided into fifths, while the decimal equivalents of fifths are stamped in the manner which make it exceedingly handy. These rules are well worth winning, and should prove an incentive to readers to get busy and get in on this work.

This series will be conducted by J. [illegible] Moore, associate editor of CANADIAN MACHINERY. He has given a good deal of attention to the matter. He knows from his school experience [illegible] in the shop and drawing office just the sort of material that is needed. He will continue in this series certain matter that he used to good advantage when conducting a course of mechanical drafting in the plant of the International Harvester Co. at [illegible]. This course was for apprentice and machinist alike, and proved a decided success, and all matter presented in this series will be dealt in such a manner that the apprentice can carry on easily.

The best method of following the series would be as follows: Cut out the pages as you receive your issue. Study the instructions, draw up the plate, then mail to CANADIAN MACHINERY the result. Our editors will carefully go over your work, when the best one received will get the prize. Remember that should you fail to land the prize one issue, there is always another issue coming, so stick to it, and keep sending your stuff along.

Not only will it benefit you in the drawing line, but such a series, intelligently followed, will increase your earning power.

So a final word. Watch for the Mechanical Drawing series, start in at once, and above all, send us in your work. CANADIAN MACHINERY is vitally interested in the future of the apprentice, so you will find [illegible] of the editors.

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Not Representing MACHINERY

THE attention of CANADIAN MACHINERY has been drawn to the fact that individuals in Toronto and elsewhere have gained access to manufacturing establishments on the pretext that they were representing CANADIAN MACHINERY. Once in, where they could gain access to the men in the shops, it was found that they were organizing for some labor union.

It is hardly necessary for this paper to state that these men had no connection whatever with this organization. CANADIAN MACHINERY, and the other technical papers published by the MacLean Publishing Co., have a number of men on the road looking for information that is worth passing on to other manufacturers, but none of these is organizing for a labor union.

Any MacLean representative can readily identify himself, and manufacturers, if in doubt, can protect themselves with a very little questioning.

Selling Alberta's Coal Output

THE coal operators of Alberta are having troubles all their own seeking to place their product in successful competition with the American coal in the Winnipeg and Western Canada market. They were quick to make use of the shortage last fall to urge upon Western Canada the advisability of turning to Alberta for their coal supply. They had a big chance to fence off the field, but they find that the element of price also enters into the deal, and in a very pronounced way. When the Pennsylvania bituminous coal meets the Alberta product in the Western market it is found that the price benefit rests with the U.S. product to the extent of fifty cents per ton.

Basing the figures on the returns for the year 1918 it is found that some two million dollars' worth of Pennsylvania coal entered the Western market. The Alberta operators make the point that were this amount spent with them it would enable them to keep their mines going for a greater period than nine months in a year. The longer the mines work, and the greater the amount turned out, it will be seen that tonnage costs come down in proportion.

Be that as it may, the problem for the West right now is how to meet the U.S. producer on a price basis in Winnipeg. Take the two points of production, and trace the costs. Starting at a mine near Pittsburgh the coal costs, including mine labor, overhead charges and loading, are $2.60 per ton.

By the time it reaches Fort Erie, where it is loaded on the boat to be carried up the lakes, it costs $4.32 a ton.

Lake freights, customs duties and various other charges bring the cost at Fort William to $5.51 a ton.

Dock handling charged at Fort William increases the cost at that point to $6.11 a ton.

Freight to Winnipeg brings it to $9.21 a ton.

And the coal dealer who handles it, delivers it, and makes a profit out of it sells it for $12.25 a ton.

That's the story in costs of a ton of Pittsburgh soft coal put into the basement of the owner of a Winnipeg block.

The Alberta coal loaded costs between $5 and $5.25 per ton, and right here the Pennsylvania coal gets an advantage of $2.63 per ton. This is not because the Alberta miners get higher wages, but physical conditions surrounding mining in this country make the costs higher. Taking a ton of coal at the mine, for which the mine owner gets $5, and adding the freight to Winnipeg, the Winnipeg dealer finds it costs him $9.80 or 50 cents more than the Pittsburgh product. And the Winnipeg dealer sells it for $12.75 as against $12.25 for the imported product and makes nine cents a ton less than on handling the imported product, while the consumer pays 50 cents more.

Alberta has a definite job ahead of it now if it wants to fence off Western Canada as its biggest and best customer for coal. That definite job consists of wearing off that fifty cents per ton difference that now rests in favor of the U.S. producer of coal. A little more efficiency in mining and handling might go a long way toward accomplishing this end, while the freight charges might be made the subject of a very close inquiry. Flattening out this fifty cents per ton in playing for a two million dollar order looks like a worth-while proposition.

Good Will the Great Asset Here

ONE of the best minds of the Old Country has given it as his opinion that many of the biggest shops in the country are being efficiency-experted to death.

There is something in what he says, although it cannot be denied that the sane efficiency expert has done much to make conditions better all around.

But the efficiency expert can only go so far, and once he seeks to go past certain well understood bounds, he is headed for failure and also for the undoing of all the work that he might otherwise accomplish.

There are some men who would run this business to such an extreme that they seek to make the entire shop simply a set of human units. They would have them move in certain limits and stop at certain marks. In fact it is a wonder that some of these chaps have not sought to equip a man with gears, pulleys, shafting, face plate, chuck and saddle, so that he could be turned into action when the whistle blows and the power is turned on for the day.

The manufacturer who is going to get the greatest service and the greatest amount of real satisfaction out of his work is the man who goes past and beyond the field in which the efficiency expert works. He must aim to enlist the sympathy and the support of his men. Get the good will of a body of men, and you have something that no efficiency expert on the face of the earth can secure for you.

In such a shop there will be no fear that a man will make too much money. If he is worth it he will get it.

The securing of such a feeling is well worthy of a great and a sincere effort, not only on the part of the office, but on the part of the men who work in the place. Both these forces are needed to bring the conditions to pass that are referred to above. The office cannot do it if the men will not, neither can the men do much toward the desired end if the office door is bolted to their efforts and advances.

THAT member of Parliament who stated that he knew families who live, dress and buy houses on $2.50 per day must have read Robinson Crusoe three or four times when he was a youngster.

WELL KNOWN IN THE MACHINE TOOL FIELD

C. P. Archibald, a Canadian Who Has Had a Wide and Varied Business Experience

ARCHIBALD, CHARLES PERCY—of Charles P. Archibald & Co., 164 St. James Street, Montreal, general machinery dealers. Born at Antigonish, N.S., Sept. 10th, 1887, son of Charles S. and Margaret A. Archibald. Educated public schools and grammar school, St. John, N. B. Married Gertrude Beatrice Bryce, daughter of James Bryce, Montreal, formerly vice-president and general manager, Canadian Express Co. Travelled Canada from coast to coast for a number of years representing the Dart Union Co., and H. W. Petrie, Toronto, and for four years was Montreal representative of T. McAvity & Sons, St. John, N.B. He started the present business in 1917, as general machinery and railway supply dealers and acting as agents for Ottawa Car Manufacturing Co., Ottawa; Thos. Davidson Manufacturing Co., Electric Steel Foundry Division, Montreal, and other Canadian and American firms. During 1918 he spent considerable time with the British War Mission, Washington, in connection with the machinery end of the work of the Mission in the United States.

Residence—Ritz Carlton Hotel, Montreal.

The Cutting of Prices

THE new prices that have been announced for United States steel and iron brought forth every diversity of opinion that could well be imagined. The schedule has been denounced, damned with faint praise and heralded as the forerunner of greater business activity. There is no doubt that the whole ruling has been a compromise between the two factions that were foremost in the negotiations.

It is interesting to note what effect these cuts will have on the earning power of the steel concerns, based on past or present production figures. The nearer a mill can come to capacity production the smaller will be the production costs, and the farther it departs from capacity the higher grow the tonnage costs. It is impossible to get away from this ruling.

When the case of some of the larger independents is considered it does not take long to see what the average of seven dollars per ton means to them. A plant having an output of a million tons of steel will have its earning power cut off to the extent of $7,000,000 per year. Take the case of the Steel Corporation. In round figures it can be said to have a capacity for turning out 16,400,000 tons of steel per year. When $7 per ton is taken off of this amount it means a drop in earnings of approximately $116,000,000 per annum. Of course, one chance for compensation is that the lower price will create a greater demand and keep the mills operating at something approaching their capacity.

Labor costs still stand in mill production, and it is hard to reason them out of the way. There has been no move on a general scale looking toward doing away with them or pruning them down.

In the year 1918 the Republic Iron & Steel Company operated its mills to full capacity. Yet its labor cost per ton alone was $32.20, a gain of $14.90 a ton in four years. As the principal wage advances were made in the last half of 1918 Republic's labor cost per ton to-day must be close to $27. Republic is one of the lowest-cost producers in the country, and it is evident that the very high cost producers will be able to show little profit on a basis of the new price schedule. It has been estimated that it is costing many independent steel companies more than $40 a ton to produce finished steel.

The new prices are still well up from the pre-war levels. It may as well be taken for granted right at the start that prices will never return to the levels that were averaged for the ten years prior to the war. The new prices are only down 14 per cent. from war-time levels, and are still a good eight per cent. above the ten-year pre-war period. Looking at the thing from that angle, and remembering the manner in which costs have gone up and stayed up, the reader is left wondering whether the cuts were severe enough or whether the standpatters should have won out.

THE Hamilton *Times* claims "Yesterday a house was burned down because the fire wagons were bogged in one of the streets." But what has become of that fine brand of folks who used to climb the roof and pour salt down the blazing chimney?

* * *

THE long lists of tax sales that are appearing in some of the Western papers are proof positive that the tax papers are wearing down the financial resistance of many an Easterner. It is one trick to get in on a good thing, and quite another to get out while the thing is still good.

* * *

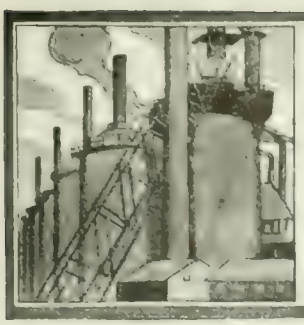
IF a League of Nations is going to come into existence, right now is the time. The reason is that there are problems that only the courage of a united civilization can meet. Once peace is signed the feeling of need for concerted action to regulate international affairs will begin to wane. Right now is the time for action.

* * *

THE Dominion Coal Co. has had, in recent months, several demands from miners for more money. Now it is faced with demands from a union of clerical workers in the offices of the company. When a concern has to face deputations from below as well as on top of the earth, small wonder if some of those concerned go up in the air.

* * *

IN the discussion that has been going on in the columns of a contemporary concerning the longest word in the English language, the latest candidate is "antitransubstantiationalistically," which easily outruns "honorificabilitudinity" and "anthropomorphologically." Such words, however, are more likely to have been used by an individual as the word "antidisestablshmentarianism" is said to have been used by Archbishop Benson, than to have got permanently lodged in the dictionary.



MARKET DEVELOPMENTS

Many Opinions Regarding Cuts in Steel Prices

They Are Still 81 Per Cent. Higher Than During the Ten Years Prior to War—Feeling That There Will Be More Buying Carried on Now—Makers of Other Lines Say Prices Will Stand Pat

THERE is a wide diversity of opinion regarding the cuts that have been made in steel and iron prices at the U.S. mills. At best the new prices are plainly a compromise arrangement brought out to try and satisfy the extremists in each group. To get a fair idea of what the new prices are, when compared to war-time and pre-war figures, take a survey of the ten-year pre-war period. Excluding rail tonnage, the levels are as follows: Average for ten years before the war, 1904 to 1913, $36; Government limit under war-time control, $76; after the reductions of December, 1918, $72; after last week's reductions, $65. Thus the prices on an average are 81 per cent. above the pre-war average, and only about 14 per cent. below the war-time level. The extremists took the following positions: There should be no cut at all, or there should have been much greater cuts.

Whatever may be the ultimate effect of the new prices, there is a feeling in Canadian trade that it will open the way for more buying than has been done for some time past. Canadian mills were quick to notify the trade that they would meet the new price list announced by the American producers, and the benefit will be immediately passed on to the consumer.

Machinery dealers report that they are handling a fair volume of trade. Although it cannot be called large, it is much more than they had expected during the first three or four months following the war. In some circles it is still contended that the actual signing of peace is needed to put things on a right basis for good business. As long as matters stand as they are at present there is room for an unsettling influence to get in its work in a way that is very hard to meet or combat.

There is still a good demand for used equipment; in fact, the bulk of the business being done is in this class of goods.

Makers of tubes, chains, wire ropes, and other lines have hastened to announce that they will not reduce prices, following the cuts in the steel market. Tubes are still much in demand, especially the two-inch kind. There is a feeling that there will have to be reductions in a good many of these lines, now that the pace has been set by the steel group. There are cases where present prices are 200 per cent. over the pre-war levels.

MONTREAL DEALERS CANNOT SEE WHERE LOWER PRICES CAN COME IN

Special to CANADIAN MACHINERY

MONTREAL, March 27. — General industrial conditions are still in a state of unrest but light is beginning to show through the fog of readjustment. Many old shell shops are anticipating early settlement with the American Government, and when this is arranged it will open the way for reconstruction on other lines; at present little can be done owing to the fact that these plants are compelled to await the finding of the committee of adjustment. Steel interests are awaiting momentous developments in the States, a feature that adds to the complexity of present conditions. Machine tool demand is quiet but inquiry is good. Scrap is dull with little demand.

Steel Developments Awaited

What the early future will develop in general industrial circles is largely a matter of guesswork. Lower price adjustments are anticipated, and this expectation has had its effect upon the sale of commodities, but any reduction on semi-finished product is dependent upon what can be arranged in regard to lowering the cost of production. There is, apparently, other factors than that of price influencing the trading in steel. Some contend that, even with lower selling prices, the demand for material would not show any great increase. Supporters of this view cite the copper situation, emphasizing the fact that the almost normal position of copper has not stimulated buying. Some of the obstacles that confront any price adjusting committee is shown in the statement made by a dealer here. "Producers, under contract," he stated, "were required to operate at capacity up to the end of the year. This necessitated the piling up of large stocks which were produced at high cost. Any radical reduction, therefore, in prevailing prices would mean considerable loss to the mills. In regard to high-speed steel the situation is virtually the same. Steel coming from England is laid down here at figures that make it next to impossible to sell at much lower prices. Labor conditions over there are such that high [illegible] costs are essential to business." These are features that tend to keep industrial activity in a very uncertain and unsettled condition. Manufacturing requirements are invariably filled in small lots, everyone taking good care not to go too far into the future. Dealers here are awaiting developments across the line; in the meantime prices here are maintained.

Metals Moving Slowly

Little can be said respecting the metal situation other than that conditions are still stagnant with buying reported on a very conservative scale. Quotations on the different metals have been gradually sinking to lower levels but without producing any further demand—covering only for immediate requirements being the feature of every movement. Producers have been looking into the prospects for export business but dealers here do not anticipate any heavy trading in this respect, at least in the near future. Copper activity here is not pronounced but business is fairly steady with volume

POINTS IN WEEK'S MARKETING NOTES

[illegible] Provincial [illegible] that the Commissioner announced last year. The rates should have been greater or not at all, and no charges or [illegible] have proved more unjust to a [illegible] than the present one. [illegible] to [illegible] and an action had [illegible] [illegible] to secure a [illegible] [illegible]

The new [illegible] [illegible] [illegible]

Steel and Iron Cut a Pure Matter of Compromise

Pittsburgh Feeling Was That the Trade Did Not Desire Any Such Action — Prices Still Average 81 Per Cent. Above Those That Prevailed During the Period of the War

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., March 27. The much heralded reduction in iron and steel prices has occurred, and proves to be more or less of a farce, particularly in unfinished and finished steel products. The action is approximately what nearly everyone was saying, in advance, should not be taken. It was generally said among producers, while the preliminary discussion was on, that either prices should not be reduced at all or they should be reduced radically. A small reduction, it was held, would do no particular good and would involve a loss to producers in that they would have to adjust prices on business already on books, in finished steel products at least. While a corresponding adjustment would have to be made if there were a large reduction, there would be a compensating advantage in that consumption would be stimulated.

Nearly everyone in the trade who expresses himself has voiced decided dissatisfaction with last week's price revision and it will naturally be asked why the industry did something of which it does not approve. The explanation appears to be that there were two contingents in the general committee that decided this matter, the one holding that there should be no price reduction at this time, the other that there should be a large reduction, and a sort of compromise was reached, satisfying no one. Of course, after there had been so much talk it was necessary that there should be some reduction. The industry could not square itself with the Industrial Board without doing something, when at the general meeting of the industry there had been a unanimous vote in favor of co-operating with the Industrial Board. Nor could the producers square themselves with the buying trade, which had come to expect price reductions by April 1 as a certainty. The mills and furnaces would have been unable to adhere to the old prices and indiscriminate cutting would have resulted, perhaps winding up with an entirely disorganized market.

The arrangement concluded really represents the maintenance of prices rather than their reduction, and the support of the Industrial Board to the procedure is obtained, with likewise, apparently, the promise of the Department of Justice that it will not interfere. The "Gary dinner" movement of 11 years ago was decided afterwards to have been in contravention of the Sherman law against conspiracies in restraint of trade. Now the Sherman law has virtually been suspended in favor of the present operation, and instead of the Industrial Board seeking further reductions it has made an official statement that it "believes that a level has been created below which the public should not expect to buy during the current year." Inasmuch, however, as the new steel prices are only 14 per cent. below the Government prices during the war, but are 81 per cent. above the average prices that obtained during the ten years before the war, 1904 to 1913 inclusive, the buying public will expect what its judgment suggests rather than what the Industrial Board now suggests.

Reductions in Detail

The official agreement between the iron and steel industry's committee and the Industrial Board was that basic pig iron should be reduced $4.25 per ton, from $30 to $25.75, this being f.o.b. furnace in most cases. The industry has interpreted this to cover a $4.25 reduction on all pig iron, retaining all the differentials, basing points, etc., that were created during the war-time control. Thus the Eastern Pennsylvania furnaces, which last September were given a Pittsburgh basis, but of late have been disposed to get back to quoting f.o.b. furnace, now return to the Pittsburgh basing. The Birmingham furnaces appear disposed to insist upon the new prices at Birmingham, instead of quoting below the general basis as they had to do in the past in order to reach northern markets. The only question is how long the furnaces can maintain differentials and practices that are contrary to the practices developed under competitive conditions during all the time before the war.

Unfinished steel products are reduced uniformly $5 per gross ton, making prices as follows: 4-inch bilets, $38.50; 2-inch billets, $42; sheet bars, $42; slabs, $41, all f.o.b. Pittsburgh or Youngstown; wire rods, $52, Pittsburgh.

Finished steel products are all reduced 35 cents per 100 pounds or $7 per net ton, except that grooved steel skelp and wire products are reduced only $5 per net ton. The new prices are as follows, all Pittsburgh basis, in cents per pound; bars: 2.35; shapes, 2.45; plates, 2.65; grooved steel skelp, 2.45 universal mill skelp, 2.55; sheared steel skelp, 2.65; steel pipe, 57½ per cent. basing discount; plain wire, 3.00; wire nails, $3.25 per keg, base; galvanized wire, 3.70; painted barb wire, 3.40; galvanized barb wire, 4.10; black sheets, 28 gauge, 4.35; blue annealed, 10 gauge, 3.55; galvanized sheets, 28 gauge, 5.70; painted corrugated, 28 gauge 4.65; galvanized corrugated, 28 gauge 6.75; tin plate, $7.00 per base box, 100 pound; terne plate, I. C., $7.05 per base box.

Price Comparisons

A weighted average, giving the price of each important finished steel product, a weight in accordance with its tonnage importance, shows prices of finished steel products in general, excluding rails, as follows per net ton: Average for ten years before the war, 1904 to 1913, $36; Government limit under war time control, $76; after reductions of December, 1918, $72; after last week's reductions, $65. Thus the new prices are 81 per cent. above the pre-war average. Copper, even at the 26 cent Government price, was only 69 per cent. above its ten-year pre-war average, while copper is now a couple per cent. below its pre-war average. The copper producers deflated their prices. Report has it that it was the copper producers who proposed to Secretary Redfield that the Government attempt to deflate commodity prices in general, because the copper producers were not getting the benefit, in increased sales, of their greatly reduced price, since copper as a rule is not used by itself but only in connection with other materials, and if the other materials do not come the demand for copper is restricted.

Buying Outlook

The steel price reduction will stimulate buying but will hardly stimulate consumption to any extent. While buyers had been purchasing only from hand to mouth for a long while past, they still found it possible to hold back purchases when it became probable that there would be price reductions by April 1, and this pent-up buying is now expressing itself, but this will hardly do more than arrest the decline in steel mill operations that has been especially pronounced since the first of this month. Consumption will not increase. Investors will not be moved to take hold and engage in building and other projects involving large quantities of steel. The Gary dinner movement of 1908 is being repeated, only this time with full Government approval. Whether the mills will hold together is the question. The other time the mills were nearly all of a mind. This time there seems to be quite a divergence.

All babies in Siam receive the same name at birth. This name is Dang, which means red.

The efficiency and safety of the subway traffic in New York is largely due to the use of the automatic train stop which absolutely prevents a train from running by a danger signal.

The oceans occupy three-fourths of the surface of the earth.

In the Australian high schools instruction is being given in the Japanese language, and it is also being taught at the military schools.

PASSING ON THE LOWER PRICES TO THE CANADIAN CONSUMERS

LOOKING FOR BETTER DAYS TO COME FOR SCRAP METAL MARKET

PNEUMATIC TOOL EARNINGS DECLINE

Chicago Company Report Gives Net Surplus as $8.30 Per Share in 1918

The Chicago Pneumatic Tool Company during 1918, according to its annual report, fell away below its preceding year in earnings, the surplus after war taxes and charges being but $955,833, or $8.30 a share of the capital stock, against $1,160,390, or $18.03 a share on the stock in 1917.

The net earnings as disclosed by the report, after provision for war taxes, were $1,283,213, against $1,778,698 for the previous year. Interest charges were much heavier in 1918 than in the preceding twelve months, while depreciation charges were slightly less. After the payment of dividends the surplus for 1918 was only $148,905, against $911,438 in 1917.

The complete reorganization of the Chicago Pneumatic Tool management, which took place in June, was discussed by the president, H. A. Jackson, in his report to the stockholders. He said that the direct result of the organization had been a greatly increased output, the new management having disposed of a considerable quantity of obsolete material after making a survey of the company's properties. Those items have been charged off, he said, on account of depreciation in inventories, machinery, etc., together with bad debts and shrinkages due to discrepancies in cost accounting and other items, amounting in all to $872,413.

"With the improvements and refinancing," the president continued, "the company finds itself in a most excellent condition, possessing well equipped plants of greatly enlarged capacity. Furthermore, the company has entered the year 1919 with an exceptional amount of unfilled business on its books. On account of depreciations necessary because of the transition from a war to a peace basis, the British and Canadian subsidiary companies are not showing a large return for the year. The British subsidiary was heavily involved in Russia and the unfortunate developments in that country have made necessary the setting aside of relatively large reserves on the books of that company. The physical condition of the subsidiaries is excellent and their unfilled business of satisfactory volume.

INCOMBUSTIBLE MATTER IN MINE AIR

The old method of computing the amount of incombustible matter in the air of coal mines, quarries, etc., was to proceed by analysis, arriving at differences after evaporating moisture, and burning what could be burned. In 1912, Monsieur J. Taffonel introduced his volumetric system. This has recently been severely tested by the United States Bureau of Mines. The Taffonel volumeter was found wanting in accuracy. But by enlarging the diameter of the tube from the millimetres to 8.6 mm., and lengthening it by 20 per cent., it was possible to increase the weight to be tested to 20 grammes, just double, and this gave excellent results. The volumetric method is much more rapid and cheaper. When controlled by chemical analysis, it was found that the difference was only 1 per cent. at the outside.—M.E.

DUSTY CEMENT FLOORS

For various reasons cement floors will become dusty and begin to disintegrate, and where this happens it is rather a nuisance, especially when currents of air cause the dust to rise. Where the floor is not greasy, in such cases it is a good plan to thoroughly wet them all over each evening, using a 5 per cent. solution of soluble water glass—soluble silicate of soda—applied with a fine rosed watering can as made for garden use. The action of the silicate is to cause silicification of the components of the floor and thus hold them together, dustiness soon being stopped by this means. Floors made with fresh Portland cement and clean shingle or granite chippings as an aggregate, and enough clean sharp sand as a filler, if properly mixed and laid, should not disintegrate under ordinary traffic, but a little dirt in the material will cause a lot of trouble. For a 4 in. floor such as would be laid on a rammed rubble foundation, four parts of hard stone held by an eighth of an inch mesh and passing a ¾ in. mesh sieve, two parts of sharp sand and free from clay or other dirt and one part fresh Portland cement, twice mixed dry and then wetted and placed in the position it is to occupy, would, after a reasonable time for hardening, stand any ordinary factory wear, always provided the men laying the floor understand their work. Old cement, or that which has set hard in the bags, is of no use for floor work. —M.M.

FOLDING BLUE PRINTS

There does not appear to be any hard and fast rule governing the folding of tracings and blue print copies of drawings when transmitting these to the various departments or by post; yet it is a process which should be given a little more attention than it usually gets. By doing so, a saving in time and temper, by those who have to handle them, can be affected, and, what is of more material importance, the papers are given a longer lease of life and utility. The general practice appears to be to fold with the particulars innermost, and in this blank condition they are sent out. This method certainly preserves the contents from disfigurement, but the objection is that it has to be opened out every time anyone wishes to glean their nature. Now this print or tracing may be only one of a pile, all presenting the same blank appearance, so that to ferret out any particular one becomes a matter of minutes instead of seconds. To overcome this objection, the title and number of the drawing should be written across the outside in all such cases and thus prevent the detrimental effect caused by excessive opening of the paper. Folding so that the particulars are outermost allows of these being readily determined, but has the great disadvantages of exposing certain portions, which soon become dirty, the lines get obliterated and, in the case of blue prints, the exposure to the light will gradually cause the lines and reading to become indistinct. A method much superior to the two referred to is for the print to be so folded that, whilst the important details are always inside, the title remains visible for easy reference, consequently the print need only be opened when it is actually required, thus providing the necessary protection to the plans or other information. Cloth tracings and prints may be treated in this manner, but it is a procedure which is not recommended; far better to treat the same as a cartridge paper drawing, i.e., keep them flat, or if they have to be transmitted anywhere protect them by tin, or cardboard tubes made for this purpose.—M.E.

LUBRICATION OF SHAFTING

To obtain efficient lubrication, a film of oil only is necessary, and to get this without waste the old dodge of using twisted worsted cotton yarn is hard to beat when properly used. The methods of application differ, although the principle is the same in all cases. A receptacle partly filled with oil forms the reserve supply, and in this there is one end of a loosely-spun thread of cotton or woollen yarn, the other end being in contact with the shafting or other part to be lubricated, the oil being drawn over by the capillary attraction. The rate at which the oil passes depends partly on its viscosity and partly on the tightness with which the yarn is spun, while for some purposes where distribution is required, a flat-woven lamp wick very well supplies what is needed. No large amount of oil is needed for well-balanced machinery which is not overloaded, provided high quality of oil is used, but it is necessary that the supply be continuous or lubrication will be inefficient. A flood of oil for half the day and dry bearings for the other half is almost as bad as no oil at all, and should be avoided in good practice. It is wasteful of lubricant and harmful to the plant.—M. M.

It is estimated that there are 200,000 square miles of coalfields in China.

The owl has no power of motion in its eye, the globe of which is immovably fixed in the socket by a strong, elastic, hard, cartilaginous case, in the form of a truncated cone; but in order to compensate for this absence of motion in the eye it is able to turn its head round in almost a complete circle without moving its body.

Experts state that the Mesopotamian plain, when properly irrigated, will produce a substantial share of the world's cotton crop.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse .....list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 7 00	$ 6 50
Sheets, black, No. 10	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head,28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$28 00	$.....
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in.	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White	Cts. per lb.		
XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X press	14
X L C R	17		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	10%	Best grades	15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

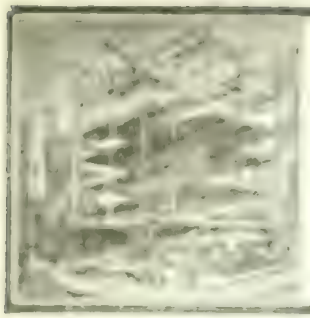
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$10 25
Sheets, 3½ lbs. sq. ft.	10 00	10 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	9 75

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.



INDUSTRIAL NEWS

NEW MINES, FACTORIES AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

MARINE

SAYS PART OF STEAMLINE OUGHT TO BE ELECTRIFIED IN THE EAST

Welland—A second Welland fire broke out at shipyards in the evening between 7 and 8 o'clock recently. The machine shop, a galvanized iron building, with sheeting underneath, was destroyed, together with its contents, including lathes, drills, ship fittings and tools. The building was worth about $3,000. H. M. Balfour, of the British American Shipbuilding Company, states that an accurate estimate of the company's loss cannot be made at the present time, but he thinks it would be in the region of $10,000.

Vancouver.—After three hours' discussion the special meeting of the Metal Trades Council decided to accept the offer placed before them by J. J. Coughlan on behalf of the Coughlan Shipyards for the appointment of a committee of six to take charge of the yard operations. This decision of the Council is an important one, and means that the labor difficulties in connection with the Coughlan Steel Shipbuilding plant are over, at least temporarily, for in the offer made by the firm it is proposed that this committee should act for sixty days, during which time the scale of wages will be paid as prevailing in other yards operating under the Robertson agreement.

London.—In order to maintain mercantile supremacy of the seas Great Britain shipping interests are contemplating converting a large part of the British merchant ships into oil-burners. Only last Friday it was announced here that a great oil combine is being formed in which Royal Dutch and other interests will get control of the Mexican Eagle Co. One of the chief reasons why the British oil interests are seeking to gain control of Mexican and other outposts is in view of the conversion of a large part of the mercantile fleet. It was also stated that as soon as the Government releases such vessels as the Aquitania and other liners they will be converted into oil-burners. The high cost of coal and serious miners' strike issues, it is asserted, have done much to drive shipping interests to the use of oil in order to regain and hold ocean supremacy. At the present time it costs ten dollars to put a ton of coal in a ship's bunkers in British ports.

MUNICIPAL

Moose Jaw.—Tenders recently called for by the City Commissioners for the supply of a 3,000 K.W.H. turbo-generator, and the necessary condensing equipment for such, were opened at the City Hall by City Clerk R. P. Riddell and Electrical Superintendent J. D. Peters. In all three tenders were received on the 3,000 K.W.H. generator, and one on a 3,500 K.W.H. unit, and five on condensing equipment. The lowest tender on the 3,000 K.W.H. generator was made by the Canadian Westinghouse Co., of $67,040, f.o.b. Moose Jaw. The next lowest tender was made by the Canadian General Electric, of $68,525. The lowest condenser tender was made by the C. H. Wheeler Co., Philadelphia, of $18,250, f.o.b. Philadelphia, on a 5,000 square foot condenser.

PERSONAL

Mr. D. H. Fleming, of St. Catharines, has been appointed town engineer of Owen Sound at a salary of $1,800, and will take over his duties about the first of next month. Before his appointment Mr. Fleming was in Owen Sound to look over the situation, and the members of the Board of Works were favorably impressed with him. He has been on the city engineer's staff at St. Catharines.

With a loss of only two lives, the Interborough Railway Company of New York has carried a total number of passengers equal to twice the population of the earth.

DELEGATES PLAN TO TOUR CANADA

New England Mission to Make a Trip Calling On All the Centres

Manchester, N.H.—Choosing this city as the most convenient and central point for their first get-together meeting, at which time the final arrangements for the Canadian trip will be made, members of the New England-Canadian Advancement Association, composed of Chamber of Commerce officials from nearly all New England cities, with a few additional interested big business men, were in session here.

Following the election of officials, balloting for the delegation which is to tour every city in the Dominion of Canada, was commenced.

Plans for the trip, which is to be made by eleven delegates, call for the initial visit to Sydney, N.S., continuing west throughout each province, to British Columbia.

Two delegates from each state are to deliver addresses at each Canadian stop, featuring their home state and its offerings, as well as listening to that of the Canadian point, with existing conditions there.

Canada's imports during the last four years were three billions and a half, of which well over two-thirds came from the United States. While her exports for the same period amounted to nearly five billions, two billions came from this country. This, the organization believes, warrants a get-together program.

At each stop the presentation of American and the organization colors, are to be made.

Quebec stops are listed as Montreal, Quebec, Verdun, Hull, Westmount and Sherbrooke. Special interest attaches to Montreal for its numerous manufactures and educational features.

TENDERS

Ottawa.—John A. Pearson, architect, Ottawa, is calling for tenders up to April 12 for the refrigerating equipment needed in the Parliament Buildings at Ottawa.

Winnipeg.—The Department of Public Works, Ottawa, want tenders up to April 16 for the extension to power house and laundry, Military Hospital, Winnipeg.

Ottawa.— The Department of Public Works, Ottawa, will receive tenders up to Tuesday, April 1, for vault lining, doors and lockers for the Assistant Receiver General's office, Toronto.

St. Catharines.—C. T. McBride, secretary-treasurer of the Public School Board, is calling for tenders for competitive plans for two single-storey schools of eight class rooms, with accommodation for manual training, domestic science and kindergarten for the city. Closing date is April 15.

Winnipeg.—Tenders are being asked by J. Schofield, architect, Room 459, Union Station, Winnipeg, for the building of a new station for the Canadian National Railways at Moose Jaw. The tenders call for the supply of all labor and materials for the erection and completion of a station building. Particulars can be had from Architect, Canadian National Railways, Winnipeg; Agent, Canadian National Railways, Moose Jaw; District Engineer, Canadian National Railways, Saskatoon; District Engineer, Canadian National Railways, Edmonton; Resident Engineer, Canadian National Railways, Calgary.

Glasgow.—New developments in shipbuilding were discussed at the annual meeting of the British Corporation for the Survey and Registry of Shipping held here recently. The chairman, Robert Clark, in the course of his address, said: "There is a good deal of speculation as to the future of reinforced concrete ships. Only three of the considerable number of seagoing barges which were ordered to be constructed under our survey are on active service. While the results are so far satisfactory, they have not yet been at work long enough to prove their worth, or have they been built under conditions which permit judgment as to their commercial value. It would have been of advantage to shipowners if a larger number of these vessels had been sooner in service, and the same may be said of electrically-welded ships and fabricated ships, as the opportunity of fully testing these interesting experiments is not likely soon to recur."

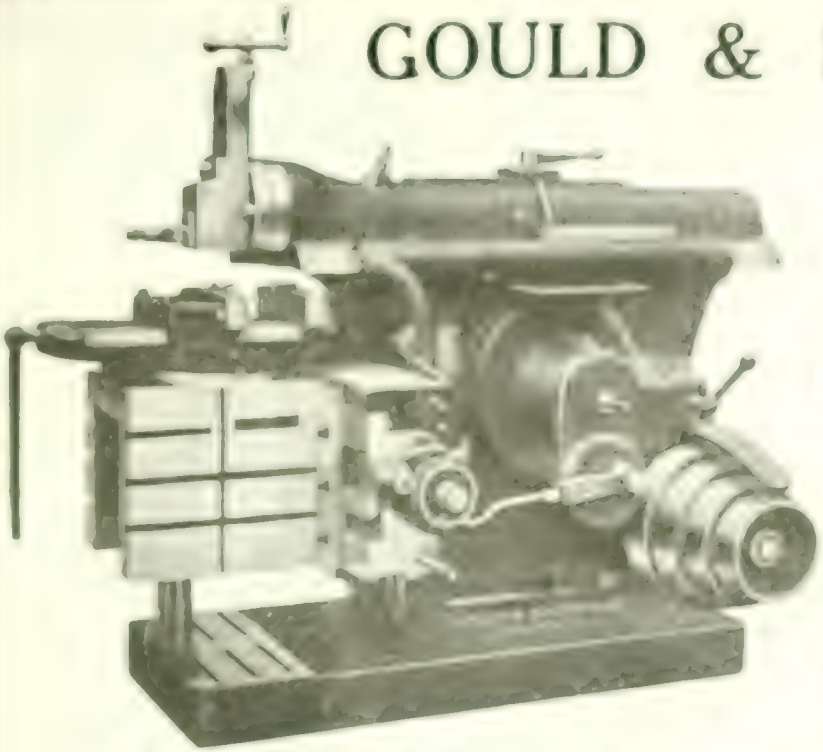
TRADE GOSSIP

Pembroke in 1918 had a fire loss of $1,086,481.

Toronto's fire loss in February was $64,054.

Ottawa will have an architect as a building inspector.

Galt raised civic laborers wages from 28 to 39 cents per hour.



GOULD & EBERHARDT SHAPERS in Stock

20", 24" and 28" Sizes

Write for literature describing the Double Triple Quick Stroke and other original features.

IMMEDIATE SHIPMENT

The A. R. Williams Machinery Company, Limited

"If It's Machinery, Write Williams"

Acid Electric STEEL CASTINGS

Railroad and Other High Grade Castings

The Thos. Davidson Mfg. Co., Limited

Head Office: 187 Delisle St. MONTREAL

WATER POWER DEVELOPMENT

We solicit your inquiries

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

Building permits in Quebec City for February were double in value the same month of last year.

It is expected that work on the Toronto to London Hydro Radial line will start soon.

Continental Oil Co. may take crude oil to a refinery to be built at Regina. An investment of a million is contemplated.

Will Get Power.—The ratepayers of Markham voted on a by-law to issue debentures to instal Hydro-Electric equipment; 108 votes were polled with only one dissenting vote. The work will commence as soon as possible. It is expected to have the power there by July 1.

After Export Trade.—Galt manufacturers are making a strong bid for export trade, and Ald. S. L. Clark, manager of the Perfect Machinery Company, has received an order from one of the largest machinery houses in London, England, for six machines, which is a trial order. Inquiries have also been received by the same firm from Australia and Japan.

JAPAN'S EYES ARE ON CANADIAN TRADE

Pig Iron Can Be Produced There at Low Rate—Cheap Labor is the Cause

Opportunities of the reconstruction era in Canada are not being overlooked by wideawake Japan. Three of that country's keenest business men have been at the King Edward since last February. All are officers of the K. Tsuda Company of Osaka, Messrs. Onoda, Kobashi and Matsuda. The Tsuda Company is the most important steel and iron concern of Nippon, something of a pocket edition of the United States Steel Trust, producing every example of the allied metals' product, from frying pans to steel rails. Mr. N. P. Onoda is the company's foreign sales manager, and largely depended upon to find profitable markets for the company's products, so that the working staff of two thousand or more need not be reduced.

"We have been kept busy on war orders until lately, and they have been profitable orders," said Mr. Onoda. "Now that the war is practically over we must find new markets or reduce production, which we hope to avoid. Consequently we come to look over the Canadian field which is more attractive to us than any other. We obtain our raw material from China exclusively, but wages, etc., there are so low and transport facilities thence so favorable, that it costs us only $1.50 a ton for the iron ore at the plant. And again, we have in our country an abundance of comparatively cheap labor and low living costs. Shipping facilities from Japan to Vancouver or Seattle are superior to those to San Francisco. There is more opportunity for great development enterprises in Canada, too, than in the United States, therefore we are hoping to work up a satisfactory Canadian export trade. We are here to study and decide how that is best to be done."

Line to Jamaica.—Kingston. — The Canadian Government has been asked to establish a direct steamship service with Jamaica, it being understood that a subsidy will be provided in case such a project is carried out. The Legislative Council has excluded shipping companies from the payment of taxes under the income tax bill which has just been passed.

Winding-Up Order.—A petition was filed at Osgoode Hall by the Toronto General Trusts Corporation against Polson's Iron Works, Limited, asking for a declaration under a deed of trust which was made in 1916 as the holder of a debenture of the company for $600,000. The petitioners ask the court for a declaration to be made that the plaintiffs as trustee, is entitled to a mortgage and charge upon all the real and personal property of the defendant company. The usual powers of a mortgage holder, including that of winding up the company is asked for.

Big Orders.—It is announced in London that immense orders for timber have come from London for British Columbia and other parts of Canada. With many thousands of unemployed and immigrants entering Vancouver at the rate of 2,500 weekly, 425 provincial timber mills were on the point of closing down. Mr. Wade anticipates one consequential result of the renewed activity to the milling business—the immediate construction of house buildings of all kinds, thus relieving the house famine in Vancouver and other cities. A further effect should be the renewed demand for land for building purposes and a tonic influence for real estate values.

Watch the Rumors.—To prevent unjustified criticism of and dissension among the allied nations of American exporters have been warned by the American Manufacturers' Export Association to sift to the bottom all published reports of import embargoes being placed abroad on exports from the United States. This action was decided upon following the receipt here of an incorrect foreign despatch stating that Australia had seen fit to decree a prohibition of all imports except those of British origin and manufacture. The report was eventually proved to be without foundation, having originated from an official decree restricting the importation of dyestuffs.

Building In Windsor.—Construction of factories with joint capital of more than $1,000,000 will be made in Windsor this year if plans of corporations now in embryo reach maturity. Incorporation of the Canadian Collapsible Rim Co. with a capital of $500,000 was announced by Frederick Kerby, attorney for the new corporation which plans to build a plant here immediately. The main office will also be located here. The incorporators are J. H. Campbell, Oulette avenue, Windsor; Sidney Anderson, gen. manager of Sandwich, Windsor & Amherstburg Ry.; James B. Gunn, Winnipeg; A. C. Smith, Windsor, and

U.S. MUST FIND OTHER MARKETS

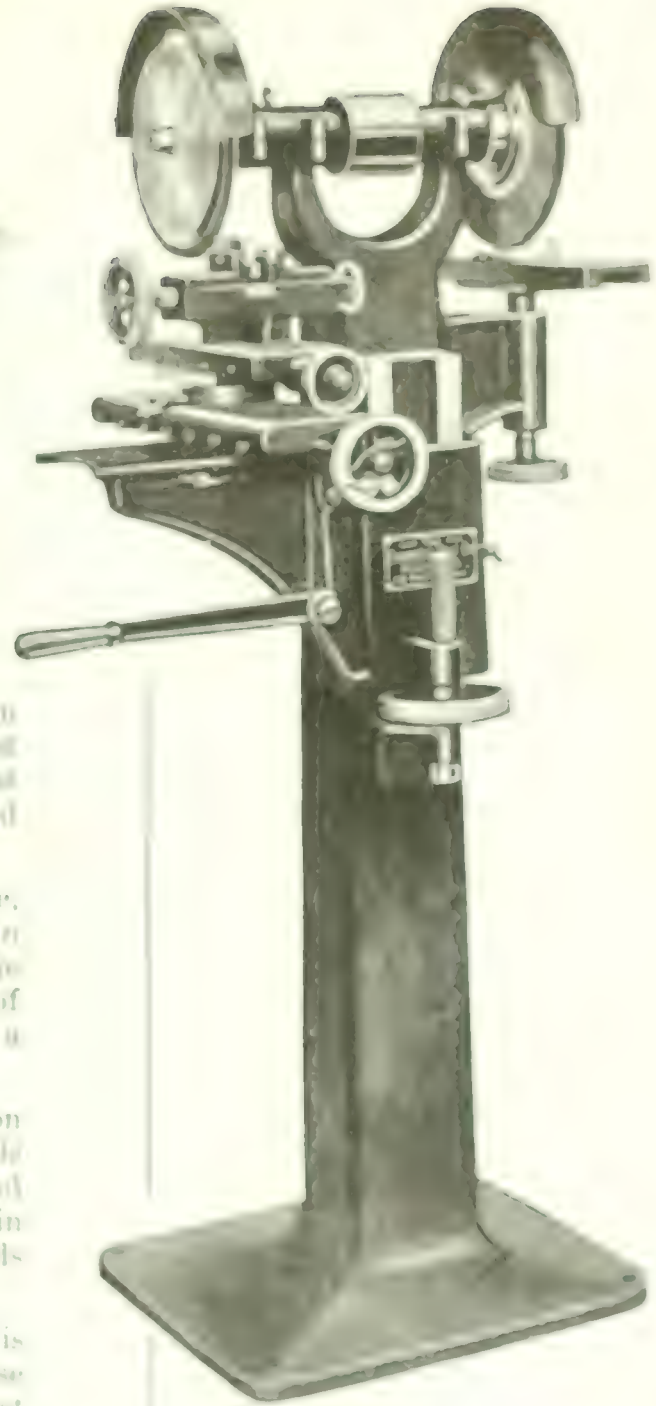
France Places Embargo on Same Lines as Adopted by Britain

Washington. — Imposition by the French Government of an imports embargo similar to the British is regarded by Government officials here as evidence that the Allies have completed their plans for industrial reconstruction and now are proceeding to put them into effect.

Great Britain and France have established a pool in this country to control whatever purchases they need to make, and Italy is co-operating with them to a limited extent. As a result, trade experts do not think there will be much sale for American finished products in the European countries for some time to come, it being the announced policy of the Allies to do without these articles which they cannot manufacture at home. Basic materials still will be obtained in the United States and probably much machinery, into the making of which technical skill and scientific knowledge enter, but it is believed the great bulk of American goods will have to be marketed elsewhere.

Eldon B. Edmunds, Winnipeg.—Efforts to obtain tax exemption for construction of a factory on city property on Howard avenue is being made by the Auto Specialties Company, St. Joseph, Mich. The company is asking the Finance Committee to put in by-law form an exemption ruling for $50,000 for ten years.

Imperial Trading Co.—On every hand there is evidence of faith in a revival in business, and new companies and firms are being formed to participate in this larger commerce. One of the new companies recently formed is the Imperial Trading Company, with head offices at the Herald Building, Montreal. This company intends to deal in iron, steel, copper, brass, lead, spelter and other metals; in rails, railway equipment; motors, generators, transformers, and machine shop tools; wool felt, cotton waste and other textile products; also pulp mill and mining machinery. The company is also negotiating for a number of sole agencies for Canada, of important products from the Orient, including China, Japan, East Indies, Malay States, Ceylon, Indo-China, Straits Settlements, etc. The president is Major G. A. E. Bury, son of Sir George Bury. Major Bury, before joining the overseas forces, was a prominent barrister in Winnipeg. He returned to Canada recently, after over three years with the Canadian Expeditionary Force. He is a graduate of the University of Manitoba. The vice-president and general manager is Mr. E. C. Peterson, formerly district manager of the Northern Electric Company, Limited. Prior to that he was in charge of the Production Department of the Western Electric



Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond gratefully with clean threads. And with this machine — the Geometric Chaser Grinder — the matter of keeping threading tools up to scratch is a comparatively simple matter.

Various makes of chasers can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tanged chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN CONNECTICUT

Canadian Agents

Williams & Wilson, Ltd., Montreal Pel. & W. Williams Machinery Co., Limited, Birmingham, The Adelphi, W. C.

Company, Chicago, with which he began his business career in September, 1899, immediately after graduating from the Iowa State College, receiving the B.Sc. degree, both in mechanical and electrical engineering.

CATALOGUES

Rochester Ball-Bearing Co. has issued a new catalogue superseding Bulletin No. 13, issued in 1914; this new catalogue having several unique features to commend it. The prints heading each page are from actual photographs, to give a clear idea how the bearing and balls appear when assembled. The one-piece retainer used in their Standard Type is light, flexible, and durable. The method used is to form three fingers on each side, which are closed over the balls in the assembling operation; this allows ample play for balls to adjust themselves to the pitch diameter of races, something heretofore not accomplished except by means of an oval hole.

The weight of retainers was another problem overcome by using one piece for retainer in the place of two pieces which, when riveted together, sometimes cramp the balls, thus causing friction between ball and retainer.

The Practical Telephone Handbook, by J. Poole, 7s. 6d., Sir Isaac Pitman and Sons, Ltd. Amen Corner, London.—The present edition of this work has been completely revised and largely rewritten with the incorporation of much additional material relating to the later developments in telephone engineering. The contents have been brought in line with the British Post Office practice. The various subjects dealt with embrace the whole field of telephone engineering and the automatic telephone exchange is described in detail, great advances having been made in its use, particularly in England and on the Continent. This work is intended as a handbook for those having to do with the operation of telephones, exchanges, line construction, etc., and the subject matter has been prepared with this end in view.

The various types of telephone systems adapted to various uses including the now almost universally adopted central energy system are described in detail, together with much descriptive matter regarding the apparatus itself. The modern exchange, multiple switchboards, junction line working, trunk line working, party line working, and other systems are dealt with. The supply of power for the operation of the central energy plant is taken up in a chapter which deals with the apparatus used and its arrangement for the continuous supply of power. Pole line and underground construction are thoroughly dealt with.

One of the more recent devices which have made long distance telephony possible is the system of Pupin loading coils, which enable the inductive characteristics of the circuits to overcome capacity effects. Transmission line calculations are given in the section devoted to this phase of operation. Multiplex telephony and the use of phantom circuits are dealt with together with the use of submarine cables. As the subject of telephony needs for its elucidation at least an elementary knowledge of electrical science, and in order that the book may be of service to the general public, the author has considered it advisable to define the various electrical [illegible] with in the descriptive matter, and to give a short sketch of the science. Telephone employees, for whom the book is chiefly intended, should find it of value and of interest from the standpoint of [illegible]

BOOK REVIEWS

Steam Engines, By E. M. Shealy, the McGraw Hill Book Co. This book on steam engines was written as a text book for correspondence students in the University of Wisconsin. It is the third of a series of three text books designed for those students who are pursuing a general course in steam engineering, the other two being "Steam Boilers" and "Heat." The fundamental principles underlying the operation of the steam engine are taught in as simple and non-mathematical a manner as possible. Enough of the practical features of steam engine operation has been given to illustrate the principles involved that part of the course dealing with valve gears has been made more complete than other sections because it has been found that operating engineers usually do not understand the valve gear mechanism of their engines as well as they do other parts.

Contents: Principles of the steam engine, Corliss and other engines, parts of the steam engine, heat work and pressure, properties of steam, indicators, indicated and brake horsepower, action of steam in the cylinder, steam engine testing, the slide valve, the valve diagram, valve setting, shifting eccentric and the Meyer valve, reversing mechanisms, Corliss valve gears, governors, compound engines, condensing apparatus, lubrication, steam turbines.

For the engineer who wishes to obtain a reference work or for the student wishing information on the principles and operation of the steam engine this work should prove quite welcome.

MESSAGES FROM THE OPTIMISTS

"We have every reason to believe that we will be just as busy as we were formerly."—Mr. Griffith, of Griffith & McNaughton, Knitting Firm, Arnprior.

"The plant has enough work to keep it busy for at least two years and many more large orders are expected."—An official of the British-American Shipbuilding Company, Welland.

"We are very optimistic as to the future conditions of Canada, and cannot see why any panic or slump in business should occur."—Mr. E. M. Arnold, of the Elmira Furniture Company.

"For our own part we fail to feel any doubt, even the slightest, as to the present soundness and future prosperity of this country."—Mr. M. R. Meldrum, Managing Director of the Morris Co.

"Whatever other firms may contemplate, the Anglo-Canadian Leather Company is going ahead with greatly increased production."—Mr. Heaven, Manager, Anglo-Canadian Leather Company, Toronto.

"I am very optimistic. There is no reason for being otherwise. I believe that after the period of readjustment Canada is going to be more prosperous than ever."—Mr. Geo. Philip Buck, President of the William Buck Stove Company, Limited, Brantford.

"Canada's prospects for the future are the greatest in the world. I do not know of any country that stands in a more favorable position."—Mr. W. H. Whittaker, secretary-treasurer of Goold, Shapley & Muir, manufacturers of Engines, Windmills, etc., Brantford.

Oh, we are all optimists here; there isn't any reason why we shouldn't be. As far as our firm is concerned we certainly cannot complain. There is enough business in sight to keep several firms like us busy all the time."—Mr. Geo. Day, Sales Manager M. Beatty & Sons, Limited, Welland.

"The general situation in Canada appears very bright to me for the reason that we have a vast and valuable country that is full of raw material. I am looking for a greater development of those resources."—Mr. G. H. Waterous, President of the Waterous Engine Works, Brantford.

"I am very optimistic and I think there is no doubt as to the future of Canada. As far as our firm is concerned we never had so many requests for equipment, and the enquiries are from all lines of manufacturers."—Mr. Hollingrake, President of the A. R. Williams Machinery Company, Toronto.

"I cannot see other than prosperity for Canada, as we have all the natural resources that make for industrial development and a great country and I think conditions are going to be brighter than ever."—Mr. J. W. Shepperson, secretary-treasurer of Ham & Nott, manufacturers of refrigerators, kitchen cabinets, Brantford.

"We are among the most optimistic in Canada, and look to the future with every confidence. This country, in the next five years, will have a wonderful demand to meet, and the only thing that is worrying us is that we will not be able to meet the calls made upon us."—An official of the Billings-Spencer Company and Canada Forge Company, Welland.

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—and they are giving satisfactory service because—

They have a good surface for gripping the pulley.

They stand belt shifter work well.

Their wearing qualities are good.

They are flexible.

They have no plies to come apart.

Mr. Plant Manager—

These belts are an experiment as far as we are aware in Scandinavia belts in Canada that have been in use from 5 to 12 years and are still good. They are other solid woven belts at the market that are sold at a cheaper price, but do you not think it is worth while investing in a belt that is known to last. Perhaps you have one you are going to experiment on in our motto is fair.

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Seven sizes.

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Plessisville, Que.

Ontario and Western Agents:
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Ottawa Toronto Winnipeg

The W. S. Rockwell Co., 50 Church St., New York, have issued Bulletin No. 39 of Rotary Annealing and Heat Treating Furnaces.

The design of the furnace is that of a rotating horizontal cylinder with a refractory or metallic spiral lining, so that when material is charged in bulk into the charging-drum at one end it is gradually and automatically conveyed through numerous convolutions and at gradually increasing temperatures to the other end, where it is automatically discharged at the exact time that it reaches its required temperature. A concentric hood serves to automatically close the discharge opening except at the lowest point of revolution and time of discharge. The hood also serves to guide the material as it leaves the furnace. The furnace is intended to handle, either for annealing or hardening, tempering, blueing or other heat-treatment, any small pieces of like dimensions in either brass, copper, steel or other metals such as cartridge shells, eyelets, ferrules, buttons, caps, cups, coin blanks, steel balls, saw teeth, tacks, screws, rivets, rings, springs, nuts, punchings, etc.; in fact, any small pieces which will travel freely and pass through the openings without choking them. The fuel consumption in this rotary furnace is low, averaging about 250 pounds of heat-treated material to a gallon of oil. The labor cost, too, is low, as the operation of the furnaces requires observation rather than labor. The charging and discharging are both done automatically. The bulletin contains a novel heat-treatment chart.

American Manufacturer Wants Representation in Canada

Our proposition should interest an established machinery supply house now calling on steam power plants in Canada. For particulars, write Box 563, Canadian Machinery.

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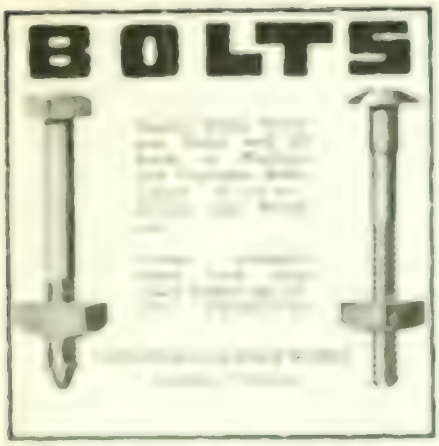
TRADE PUBLICATIONS

The United States Steel Products Co., New York and Toronto,. have issued "Tool Steels," containing data and tables appertaining to electric tool steels manufactured by the Carnegie Steel Co. The various classifications of steel are given according to its uses, proceseses of manufacture and chemical composition, together with the factors affecting the qualities of steel. The main portion of the booklet is devoted to the heat treatment of steels and especial attention is devoted to the heat treatment of alloy steels. The value of this portion is greatly enhanced by the excellent illustrations accompanying the text. Photographs of test specimens which have undergone heat treatment are shown and a color chart is given showing the actual colors together with the corresponding temperature range. Tempering is usually controlled by means of the colors produced on polished steel at various temperatures and as an aid in the controlling of this temperature a color chart and table are given for the different classes of articles usually met with. In addition to the above a list of the various tool steels manufactured by the firm together with the various uses to which they are best adapted is given.

Shawinigan Magnesium is the title of a recent publication issued by the Shawinigan Electro-Metals Co., Montreal. This booklet contains much information of value relative to the uses of magnesium. Data for this booklet was obtained from the company's own laboratory work from technical literature and from users of magnesium. A chapter devoted to foundry practice gives uses and instructions which have been of value in both the ferrous and non-ferrous foundry trades and the information given on its use as a deoxidizing agent is of int-



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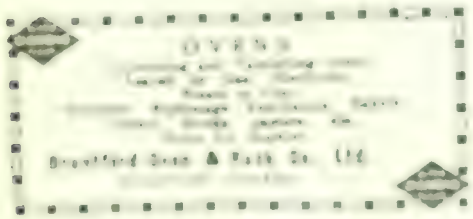

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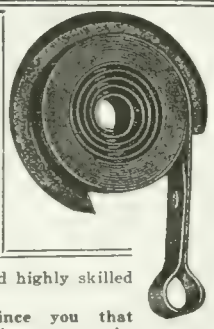

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$4 thermometer? I did not, and now I don't care what the temperature of the feed water is. I wouldn't turn my hand if the boilers were taking ice water."—JOSEPH W. HAYES in "System."

BUSINESS CHANGES

Renfrew Mercury.—A few days ago there was a rumor about town that Mr. Thos. A. Low had bought out the interests of Senator O'Brien in the Renfrew Machinery Co., Limited. Rumor was only partially right. There had been a transfer of interests; but it was the other way about. On making enquiry at the head office of M. J. O'Brien, Limited, The Mercury was informed that that company had purchased outright Mr. Low's share in the Machinery Co., the transfer of his stock having been made on Wednesday. Mr. Low being out of town when The Mercury learned the facts, we are not in a position to say how far this sale may indicate a further development of some of Mr. Low's other industrial interests here.

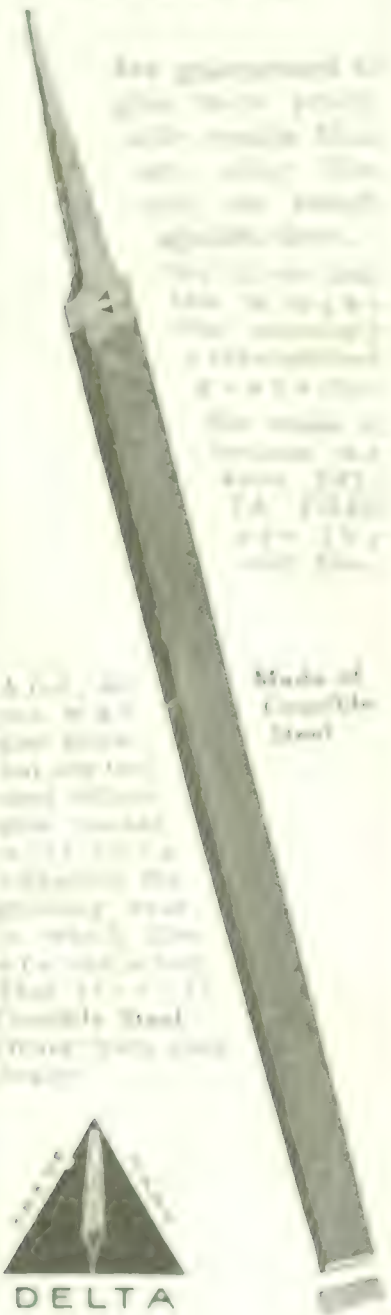
CASTING IN BURNT-OUT MOLDS

There is a class of molding and casting which, while having no particular value in an economic sense, has yet an occasional value, and is for this reason worth remembering. In the cire perdu process the wax pattern or model is surrounded with the plaster mold, eventually being melted out and replaced by metal, the mold then being broken off and a metal replica of the wax pattern secured. In the burnt-out process the original—say a flower, small animal, or the like—is put in place of the wax model, the mold material is poured in, dried, and then brought to a heat, which will reduce the mold to ashes, then the ashes are cleaned out and replaced by molten metal, the mold being preferably red hot, and when cold the mold is broken away and the casting cleaned up, when it should be a perfect replica of the article selected for reproduction. Obviously, plaster as used in the cire perdu process would not stand the heat, and probably the best molding medium is finely ground gannister, as used in steel furnace work, this being reduced with water to a creamy state and deposited on the model by gradual settlement from the water, fresh supplies of the reduced gannister being added until the required bulk has been secured. Pipe clay, as used for making tobacco pipes, could also be used, and one or two other refractory materials are available, but gannister would probably work best with most people. After the material selected has subsided the water should be poured off, and the mass should dry naturally until the bulk of the moisture is gone and then gradual heating should drive off the rest, and as the mass becomes dry it should be gradually brought to a bright red heat and kept heated until the mold is reduced to ashes, which should be removed and their place filled with molten metal in as fluid a state as possible. As the mold is broken up in removal from the casting some little care is necessary in its preparation, while probably at first a little practice will be found necessary to get the right knack in working.—M. M.

Flying Men Are Certainly Farsighted

Have you read page 68? It will interest you.

Delta Files



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IF YOU ARE LOOKING FOR A SUPERINtendent or general foreman, a Canadian citizen with twenty years varied shop experience in Canada and United States, a thoroughly live man with executive ability, one that can lower the cost and raise the quality of your product, just get in touch with the advertiser. Box 566, Canadian Machinery. (c14m)

OFFICE POSITION, PREFERABLY PRIVATE secretary, with firm manufacturing or handling motor vehicles or machinery, by young married man, Canadian. An experienced accountant, shorthand writer and typist. Have just completed the Complete Gas Engines Course of the International Correspondence Schools. Best references. Reply P.O. Box 566, Lethbridge, Alberta. (c13m)

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MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

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ONE SECOND-HAND JENCKES CORLISS ENgine 12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

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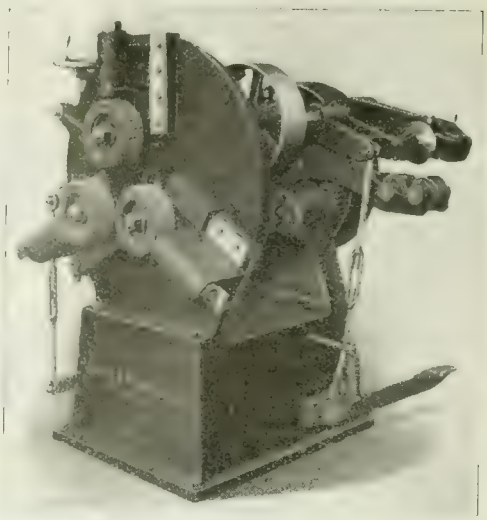

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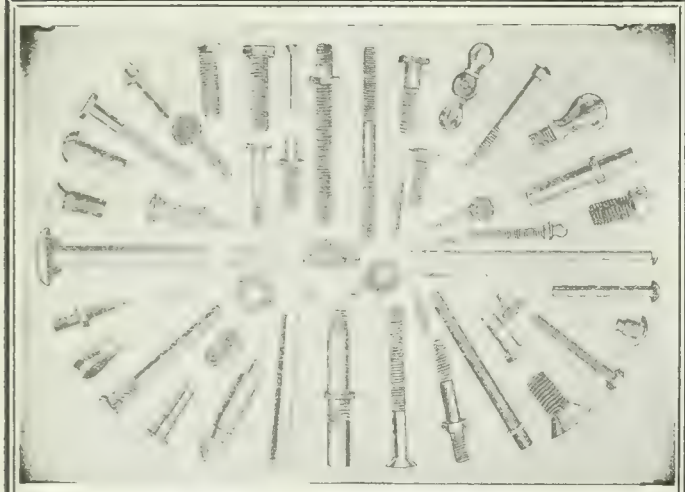

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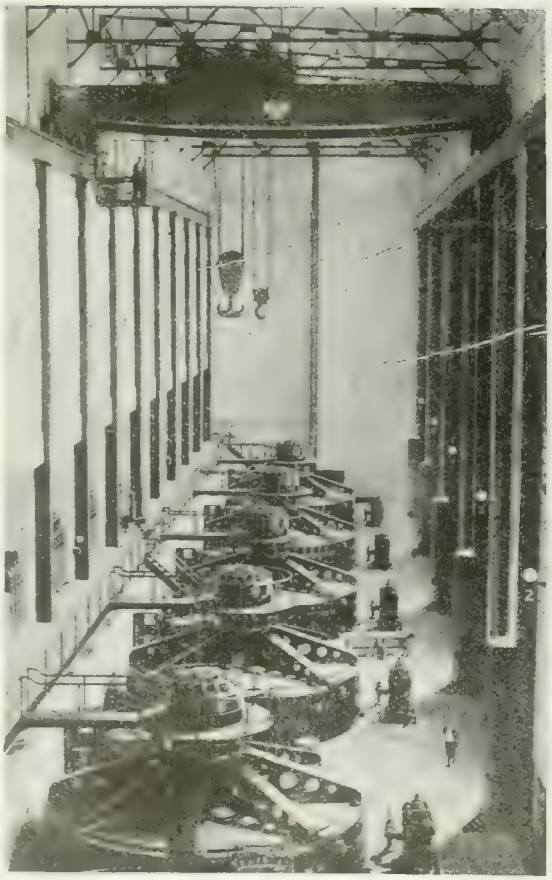

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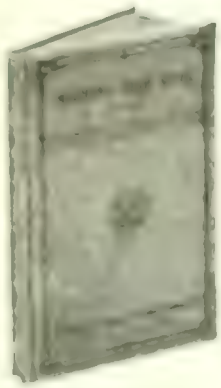

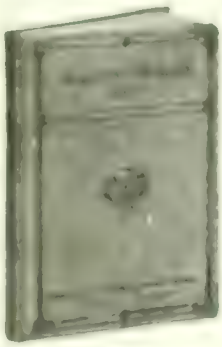

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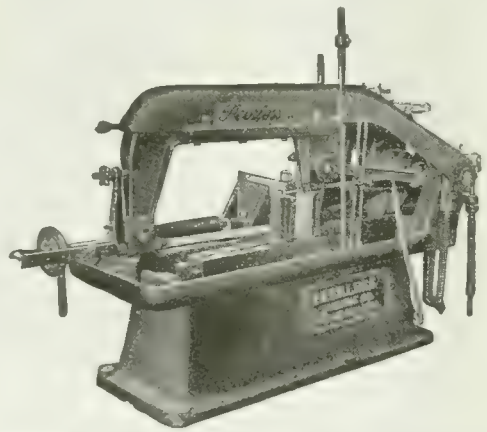


It increases production 50 to 100 per cent. with the same number of machines, at a greatly reduced cost.

Or it gives the same production with two-thirds to one-half as many machines, saving in investment, in attendance and in floor space. And in all cases it saves in expensive material and saw blades.

Proof can be furnished in the record the Peerless High Speed has made with many large concerns of international reputation. Further proof and the best proof will be to try it in your own shop; and if you think you can afford to do without it after 30 days' use, we will pay freight both ways.

Write for description, names of users and trial plan.

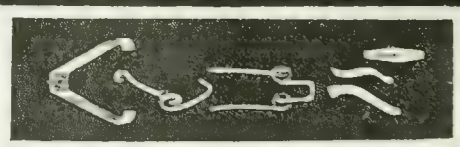
PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

DUNBAR SPRINGS

are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.

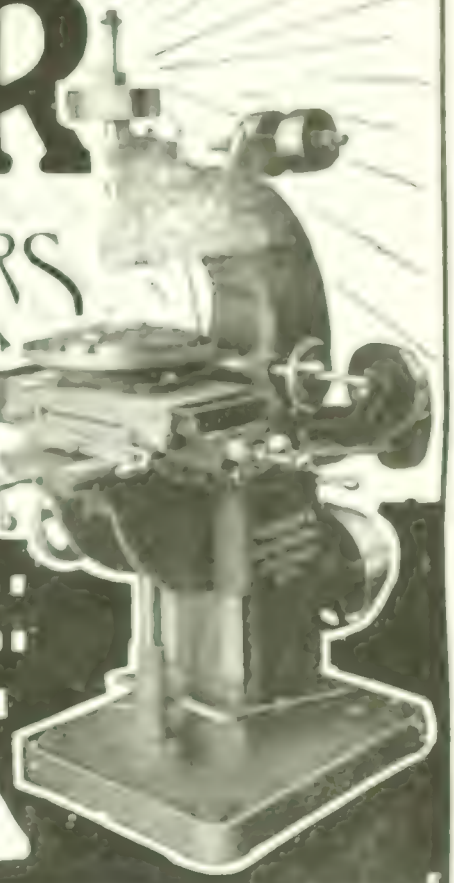


The Dunbar Brothers Co. BRISTOL CONN.

BECKER

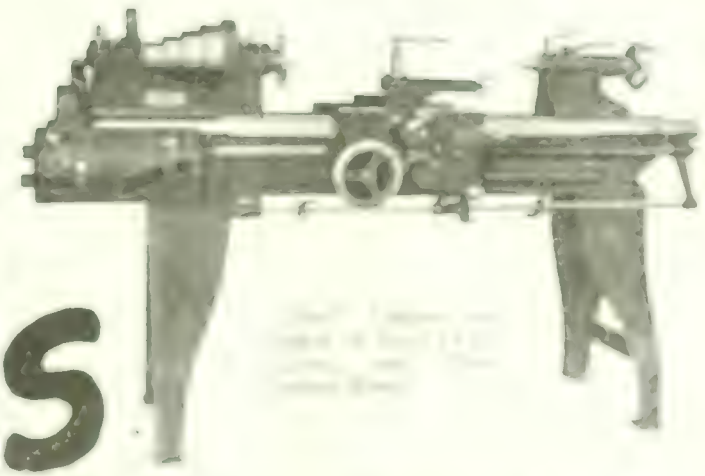
BELT DRIVEN MILLERS

The Machine that
Gives the Smooth Finish



The Becker Milling Machine Co.
Hyde Park, Boston

STAR LATHES

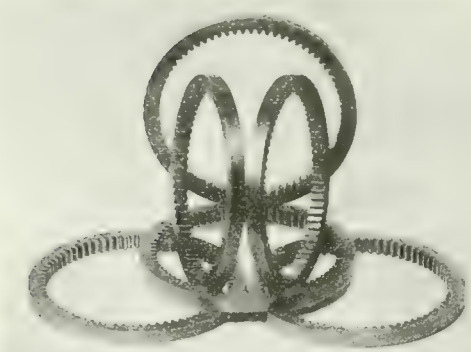


SCIENTIFIC INSTRUMENT SHOPS, TOOL ROOMS, EXPERIMENTAL DEPARTMENTS, MANUAL TRAINING, AND FOR LIGHT, ACCURATE COMMERCIAL WORK GENERALLY

The Seneca Falls Mfg. Company, Inc.

Internal Gears

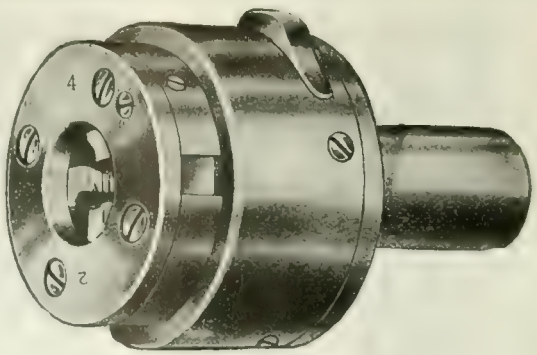
A difficult gear with old-style methods, but our modern machines produce them cheaply with extreme accuracy.



INTERNAL GEARS with involute teeth truly generated on Fellows Gear Shaper up to four d.p. standard or three-four d.p. stub, 36 in. diameter.

Get Our Quotations

Hamilton Gear & Machine Co.
Van Horne Street - TORONTO



H & G **Die Heads**

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

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New Haven, Conn., U.S.A.

GAUGE MAKERS TO THE TRADE

You need special tools—we need your work. Send us your blue prints for estimates on following:

Gauges, Tools, Dies
Special and
Rolling Mill Machinery

High-grade workmanship and accuracy on all work guaranteed.

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LIMITED
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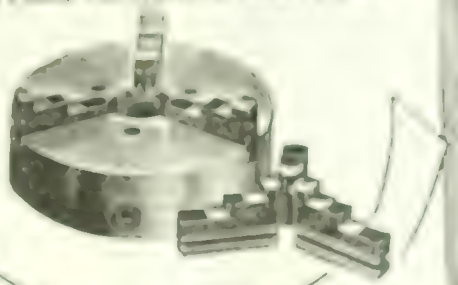
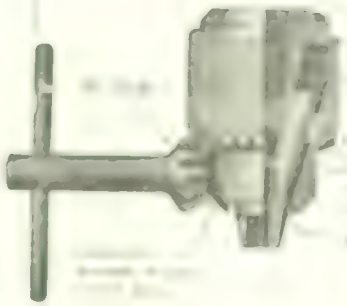
Nothing but Chucks and Their Accessories

FOR NEARLY 40 YEARS
AND OUR PRODUCTS SHOW IT



ALMOND
CHUCKS & MICROMETERS



T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

JACOBS
IMPROVED DRILL CHUCKS

Conceded:—

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2. Merit—the measure of their popularity
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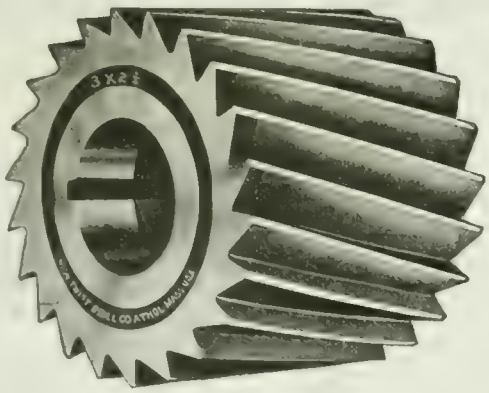
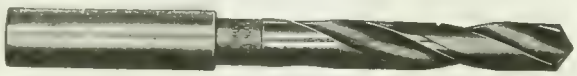
THE JACOBS MFG. CO. HARTFORD, CONN. U.S.A.



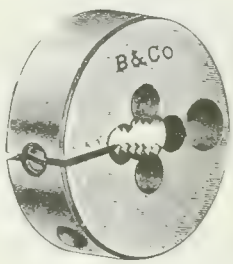
Butterfield

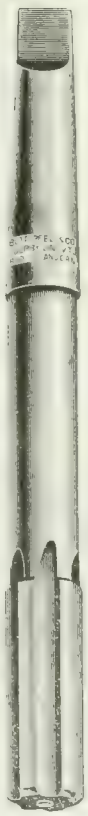
Taps, Dies, Reamers, Drills, and Milling Cutters



A TRIAL will convince you that Butterfield Tools have the quality and construction that set the pace in tool economy.

Ask for catalogue No. "17" and "A."





Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office: 220 King Street West

12

B-T THREAD LEAD INDICATOR

Be Sure Your *Right*—Then Go Ahead

Getting the right thread lead instantly, and maintaining a constant check upon it, minimizes the possibilities of delays in assembling and reduces the number of parts scrapped through incorrect measurements.
B-T Thread Indicators detect errors of one thousandth of an inch from correct lead. They are easily read—absolutely accurate and can be used for testing odd pitches, as well as external and internal threads.

BICKNELL-THOMAS CO.

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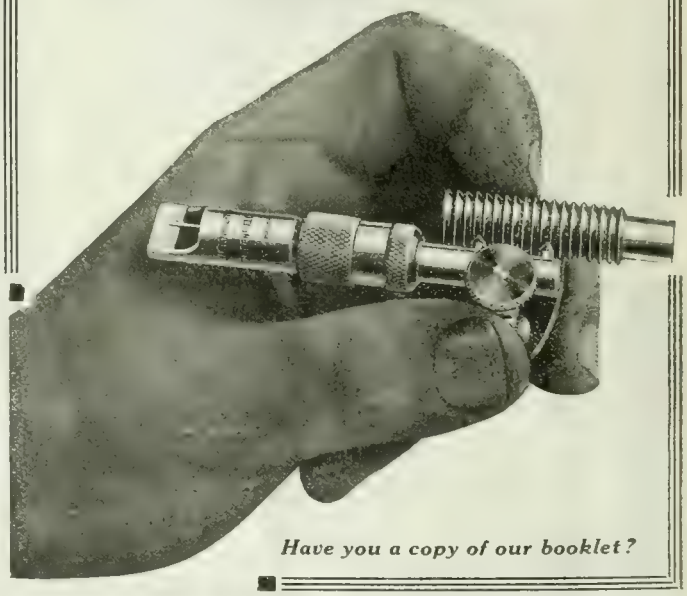

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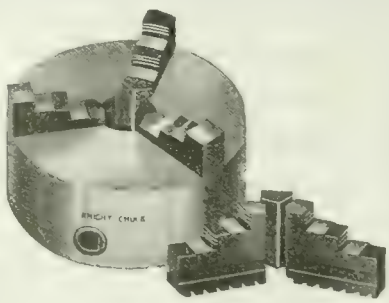
"Knight" Scroll Chucks

The "Knight" Geared Scroll Chuck is substantially constructed by expert workmen, using high-grade materials, and is guaranteed to be commercially, mechanically perfect.

Sizes from 4 inch to 10½ inch.

Domestic and Export Trade Supplied.



Knight Metal Products, Limited

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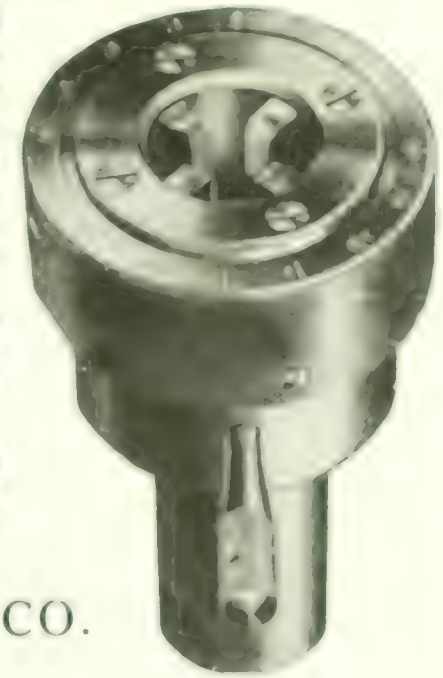
The Murchey Way!

The "Murchey Way" is to keep well in advance in the matter of all things pertaining to the **accurate** production of their well-known **Collapsing Taps** and **Self-Opening Dies**.



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NAMCO-DUPLICATE "MADE TO YOUR SPECIFICATIONS" PARTS

Special screw machine products in sizes up to 2½" diameter 10½" long. Also

STANDARDS IN STOCKS

Plain, Castellated, Semi-finished NUTS; S.A.E., U.S.S. CAP SCREWS; U. and U.S.S. SET SCREWS

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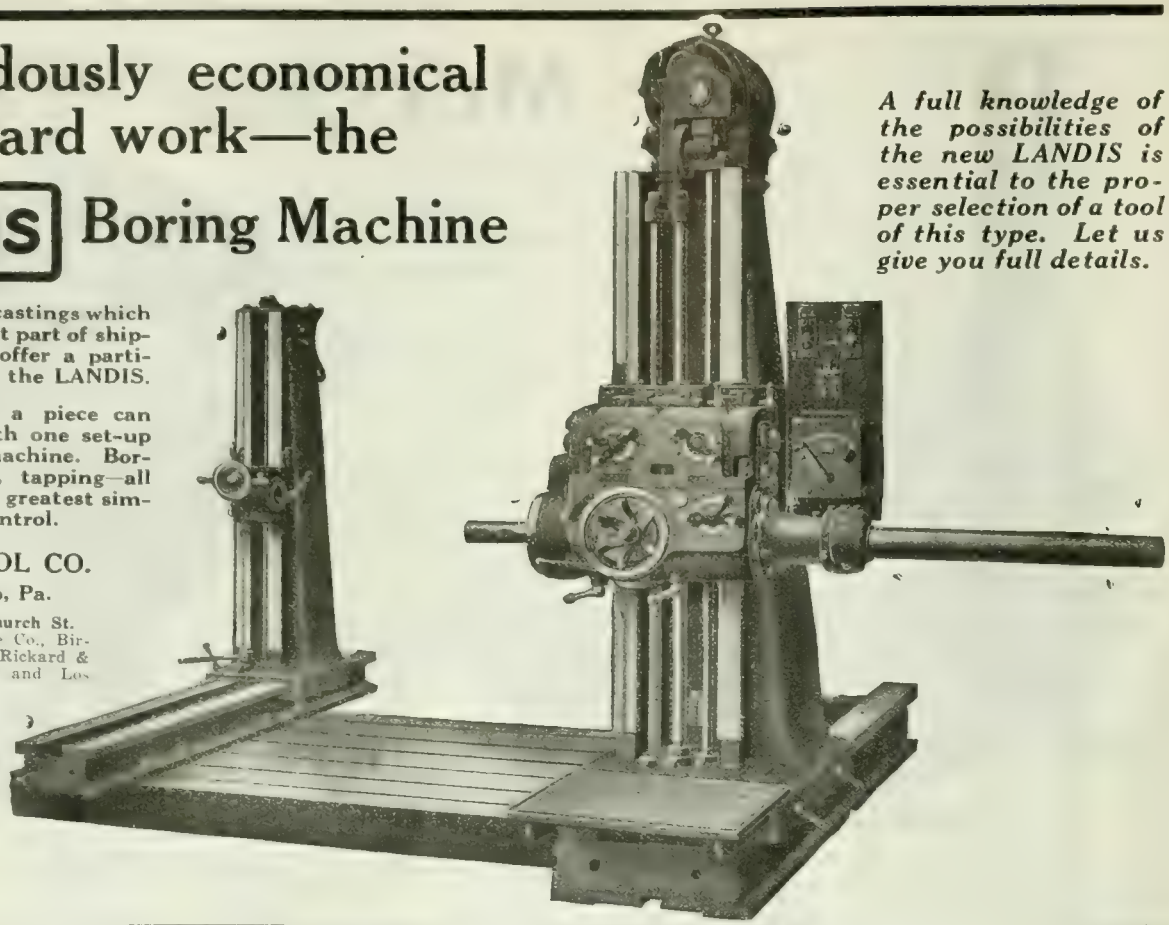
THE NATIONAL ACME COMPANY

MONTREAL, P.Q.

Tremendously economical on shipyard work—the LANDIS Boring Machine



A full knowledge of the possibilities of the new LANDIS is essential to the proper selection of a tool of this type. Let us give you full details.

The big, unwieldy castings which comprise such a great part of shipyard machine work offer a particularly good field for the LANDIS.

All operations on a piece can often be handled with one set-up of the work on this machine. Boring, facing, drilling, tapping—all are possible with the greatest simplicity and ease of control.

LANDIS TOOL CO.
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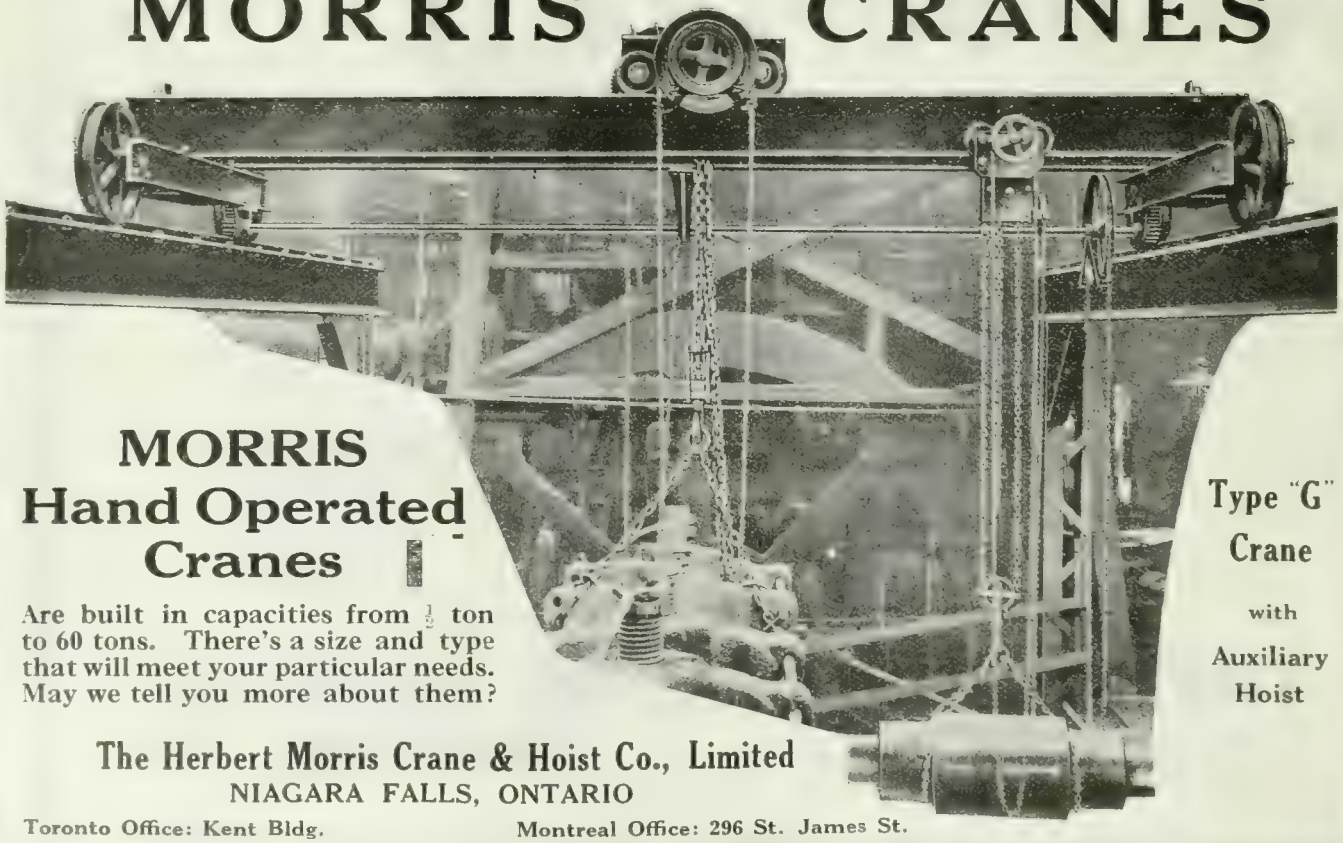
New York Office, 50 Church St. Agents: Dewstoe Machine Co., Birmingham, Ala.; Harron, Rickard & McCone, San Francisco and Los Angeles.

MORRIS CRANES



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Are built in capacities from ½ ton to 60 tons. There's a size and type that will meet your particular needs. May we tell you more about them?

Type "G" Crane with Auxiliary Hoist

The Herbert Morris Crane & Hoist Co., Limited
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We are looking for a Canadian concern to manufacture our line.

We would like to interview with a prospective company to operate with a view to having our line of fine-cut hollow mill and will in Canada for the Canadian market. Our line consists of reaming tools and boring and facing heads, counterbores, chucks and cutters and boring bar fixtures, universal joints, reamers, etc.

Please write us at your earliest convenience.

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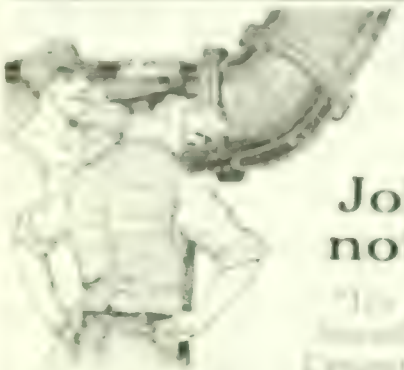

"No Sir! That Joint Cannot Leak."

"It's made with Smooth-On Elastic Cement No. 3."

"Have I simply cut gaskets of hard rubber with Smooth-On Elastic Cement No. 3, clamped up the bolts, and expected at the Smooth-On as a liquid just like it."

Get a Can Now and Try It. Handy and put it to Work.

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Oxy-Acetylene Welding and Cutting

Welding New Teeth On Metal Gears

Prest-O-Lite PROCESS

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Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
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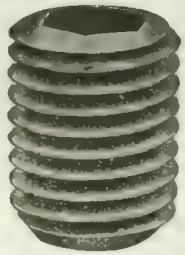

ALLEN SCREWS

With clean hexagon socket holes and uniform threads provide absolute safety longer than any other screw. You may have seen screws that looked like the Allen, but you have never seen one with its strength, because the Allen is made differently.

THE ALLEN MFG. COMPANY
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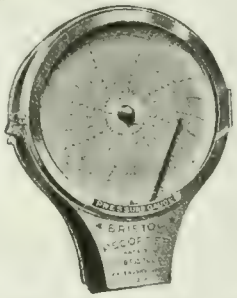

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BRISTOL'S
REG U S PAT OFFICE
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are unique in their extreme simplicity of construction. The continuous night and day records obtained with these recorders show the actual pressure maintained throughout the twenty-four hours.

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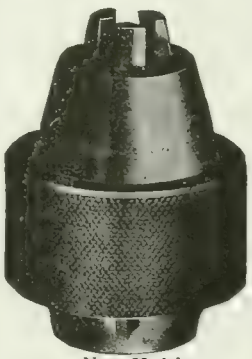

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Made By Any Manufacturer

The "New Model" is especially adapted to rapid, sensitive drilling. It is accurate, light, strong and hand operated.

The price is surprisingly low. Illustrations of complete line on request.

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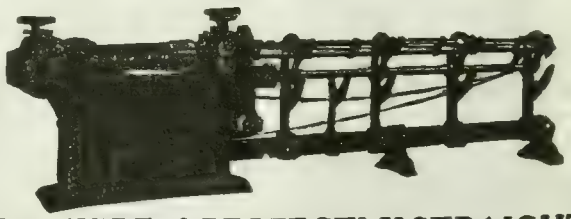

THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Beaudry Hammers
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Save Fuel, Time and Labor. Cut Forging Costs in two.

Belt or Motor Driven.

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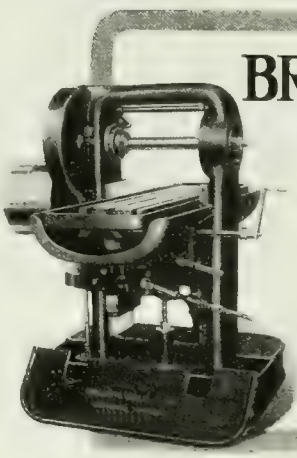

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This Miller is breaking production records wherever introduced. It handles work no other machine of its size can touch and it does perfectly accurate work. Rigid, powerful, accurate.

We should like to show how "Briggs" adaptability and convenience can better output and lower costs for you. Get in touch with us.

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WE SELL METALS OF ALL KINDS

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Pumps for any Service Steam Appliances Freight Elevators Webster Vacuum Heating System

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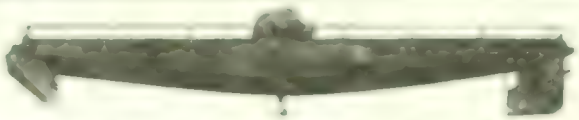
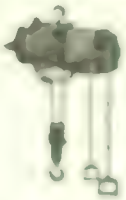
Gear Cutting Machine

The D. E. Whiton Machine Co.

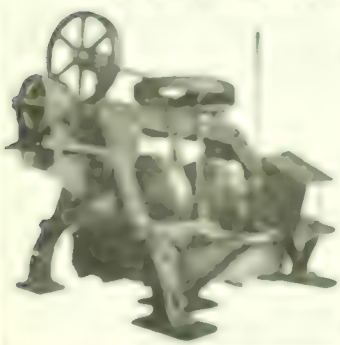


NORTHERN CRANES



NORTHERN CRANE WORKS

Canadian Steel Foundries Need Frost Improved Sand Mills



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6 Positive Geared Feeds

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The Silver Manufacturing Co.

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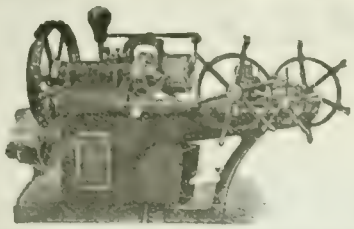
"Maintenance of Quality"

J. C. McLAREN BELTING CO., LTD.



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"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.

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In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

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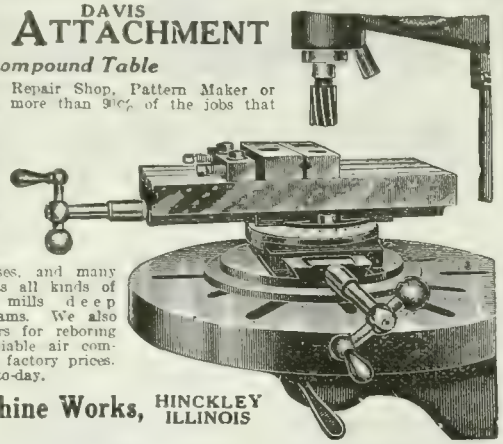
For the Die Maker, Repair Shop, Pattern Maker or Garage, will perform more than 90% of the jobs that come up.



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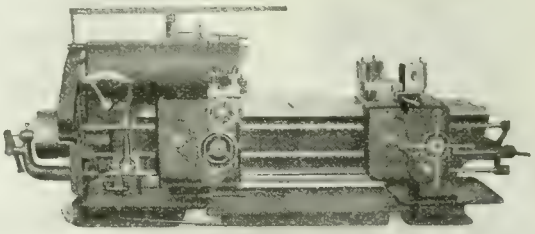

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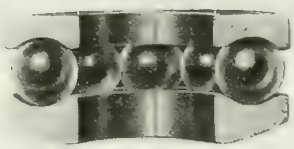

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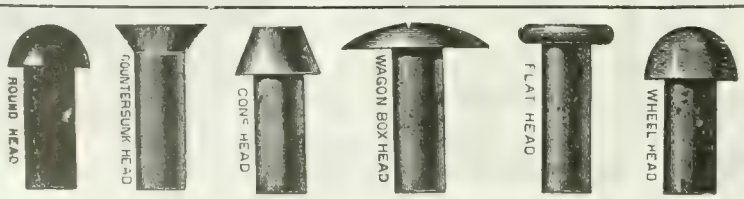

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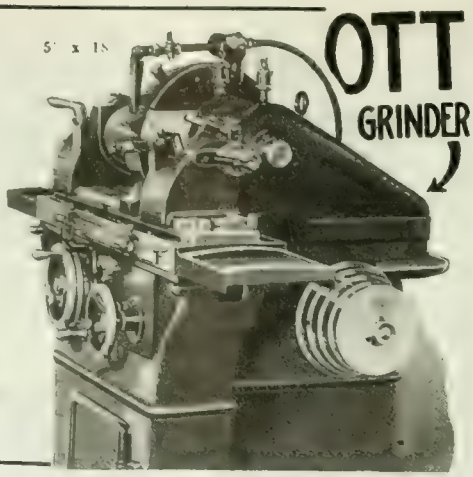

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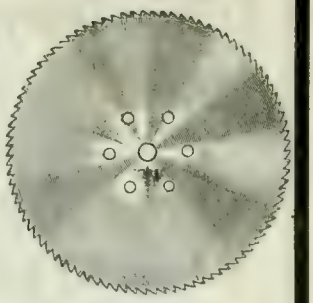

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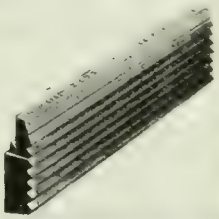

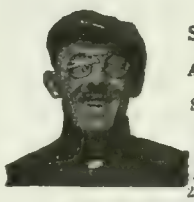

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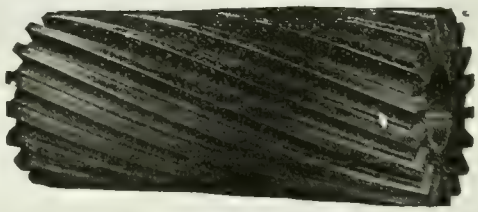

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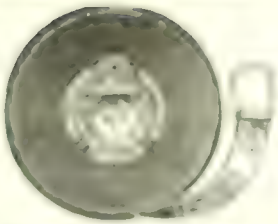

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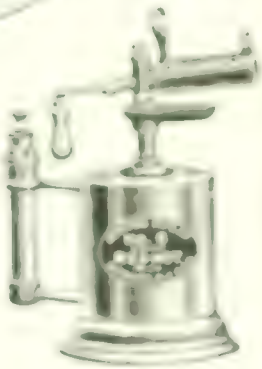

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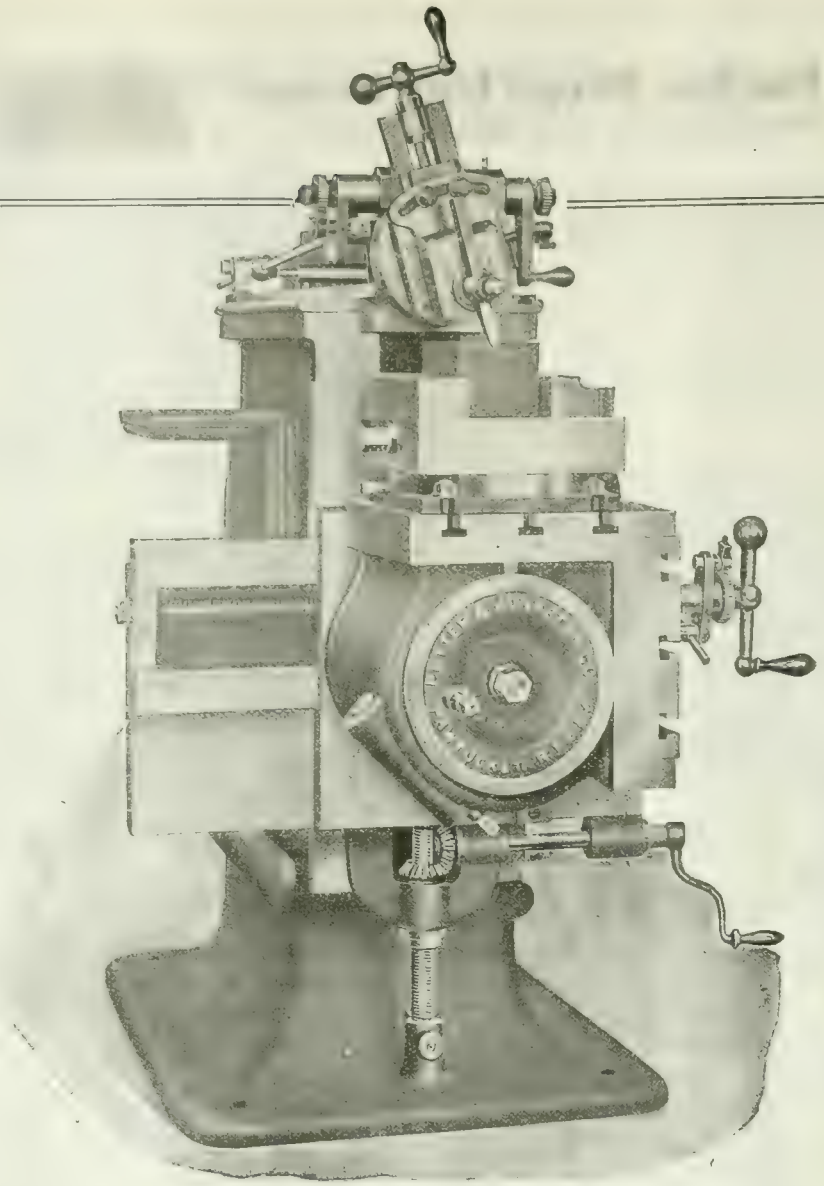

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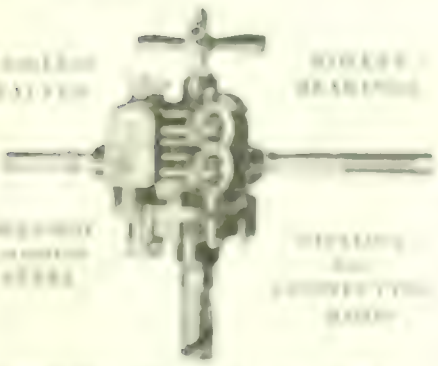

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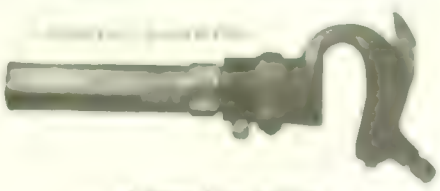

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Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
Macdonald & Co., Montreal, Que.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Canadian Machinery Co., Toronto, Ont.
New Haven Tool Co., New York.
Can. Blower & Forge Co., Kitchener, Ont.

COPPER, BUS BAR, SHEET, PLATES, RODS
Dominion Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Alpena Mfg. Co., T. R., Ashburnham, Mass.
Barrel Machine Co., Bridgeport, Conn.
Dodge Manufacturing Co., Mishawaka, Ind.
Foote Stove Mounting Co., Hamilton, Ont.
Foote Machine Co., Elkhart, Ind.
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, FRICTION
Dominion Industrial Co., The A., Deschambault, Que.
Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hamilton, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found'n & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURB PUMPS FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, BOLT
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson Limited, Montreal, Que.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co. Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford Smith Machine Co. Hamilton, Ont.
Large-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal, Que.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson Limited, Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Bonfield, W. H., & Son, Toronto
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies Ltd., Montreal
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal
Norton, Ralph B., Agent, Montreal

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

DRILL RODS
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John Co., Rockford, Ill
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson Limited, Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York
Henry & Wright Mfg. Co., Hartford, Conn
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rockford Drilling Mach. Co., Rockford, Ill

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RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.

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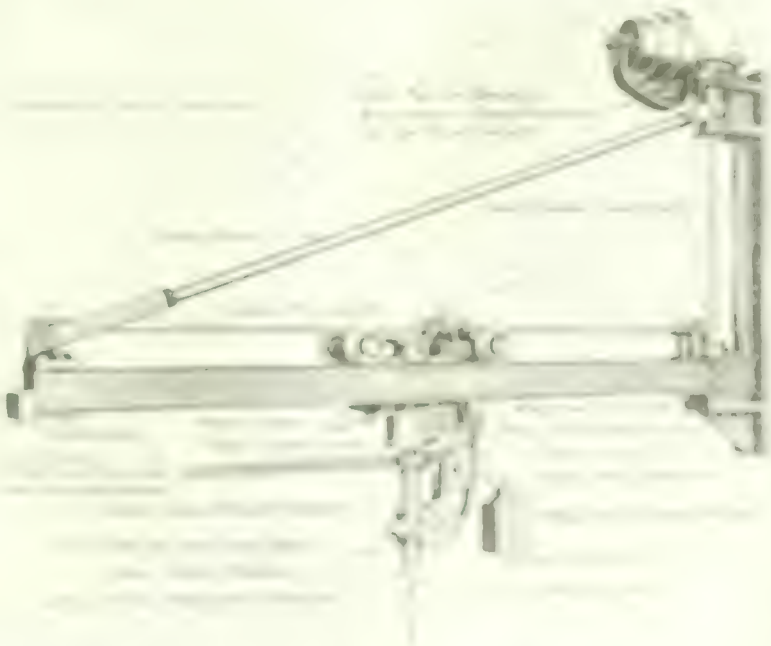

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Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio
Williams & Wilson, Limited, Montreal, Que.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EARTH HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRY CLEANING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

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Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Truing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co. ,Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS
Harbison-Walker Refactories Co. of Canada, Montreal, Que.

FITTINGS, MALLEABLE AND CAST IRON
Fittings, Ltd., Oshawa, Ont.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Ltd., Montreal.

FUEL OIL SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.

Great Possibilities Under The Trade Agreement Between Canada and Britain.

"THE wiping out of the handicap which Canadian products met in the British market, and the granting of what is equivalent to a preference for Canada temporarily, at least," says THE FINANCIAL POST, "should result in a great impetus to our immediate trade with the mother country. If permanent, as it is almost certain to be, if we keep men of the Borden, Lloyd Harris capacity on the job, it means tremendous immigration and the settling of millions of acres of farm lands. It means the extensive development of present and the establishment of numerous new industries in Canada, to take advantage of the preference; bringing in hundreds of thousands of mechanics and mine and forest workers. For example, the Canadian subsidiary of the U. S. Steel Corporation, which has been marking time, will, in all probability, now go ahead energetically with their twenty or thirty million dollar plant development here. In fact, it is quite probable that within a week plans will be completed and action taken for the immediate erection of about 1,500 workmen's houses at Orillwayt, Ont. As we go to press we read in cables to U.S. papers that scores of American manufacturers and other business developers who have been in Great Britain are returning home feeling that there is now little hope of overcoming the handicaps of prohibition of imports and preferences unless they establish branch plants in Canada or the United Kingdom."

THE FINANCIAL POST

OF MARCH 15th CONTAINS:

E. P. JONES SPEAKS OF EMBARGO REMOVAL

Britons Will Result in a Number of Large Orders for Canada

Note These Contents of THE POST Dated March 22nd

Tariff Revision Must Be Made On Scientific Basis

Manufacturing Situation Misunderstood

Business Building News Items Appear Each Week in *The Financial Post*

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GALVANIZING PLANT
Matthews, Bragg & Iron Wks., Ltd., Wpg., Can.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GAUGES
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Swedish Gage Co., Inc., Montreal.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Kayser Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

GENERATORS, ELECTRIC
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

GOGGLES
Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
United States Electrical Tool Co., Cincinati, O.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Greenfield Machine Co., Greenfield Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids Mich.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN
Grand Rapids Grinding Mach. Co., Grand Rapids Mich.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Wing & Son, J. E., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Limited, Montreal, Que.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Limited, Montreal, Que.

GRINDING MACHINES, CAR WHEEL, CUTTER, CYLINDRICAL, CRANKSHAFT
Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Norton Co., Worcester, Mass.

GRIT, ANGULAR
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

GUARDS, WINDOW AND MACHINE
Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

GUN TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

HANDLES, BALANCE, CRANK AND MACHINE
Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

HACK SAWS, POWER
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, AIR
Erie Foundry Co., Erie, Pa.

HAMMERS (DROP), MOTOR AND BELT DRIVEN
Beaudry & Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Limited, Montreal, Que.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited Montreal, Que.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

Rockford Horizontal Boring Machine

For
Automobile
Manufacture

The Rockford Drilling Machine Co., Rockford, Ill.

HAMMERS, NAIL MACHINE
Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND LEATHERS OR PADS
Graton & Knight Mfg Co., Montreal.

HANGERS, SHAFT
Algoma Steel Corp., Sault Ste. Marie, Ont.
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HIGH SPEED STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.
Kayser Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

HIGH SPEED TOOL ROOM DRILLS
Albany Hardware Spec. Co., Albany, Wis.

HIGH SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
J. F. A. Comstedt, New York City, N.Y.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Greenfield Tap & Die Corp., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.

HOBS, MILLING

HOISTS, AIR
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal, Que.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal, Que.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Gutta Percha & Rubber, Ltd., Toronto, Can.
Pangborn Corporation, Hagerstown, Md.

HOSE, STEAM
Gutta Percha & Rubber, Ltd., Toronto, Ont.

HYDRAULIC MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal, Que.

HYDROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal, Que.

INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal.

IRREGULAR CUTTING SHEARS
Quickwork Co., St. Marys, Ohio.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.
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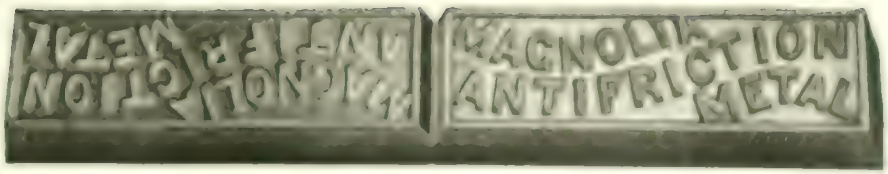

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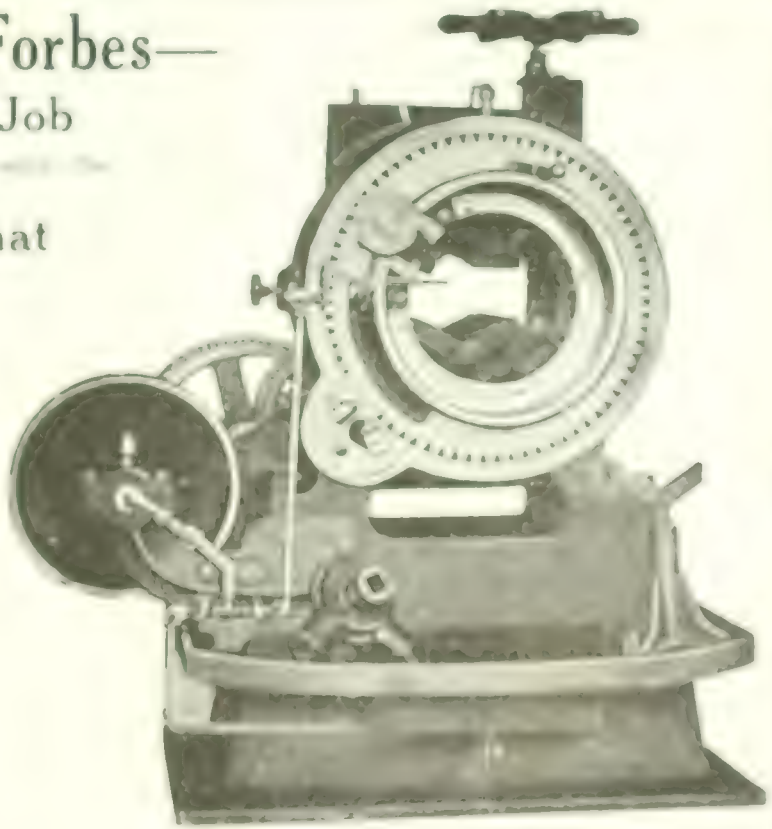

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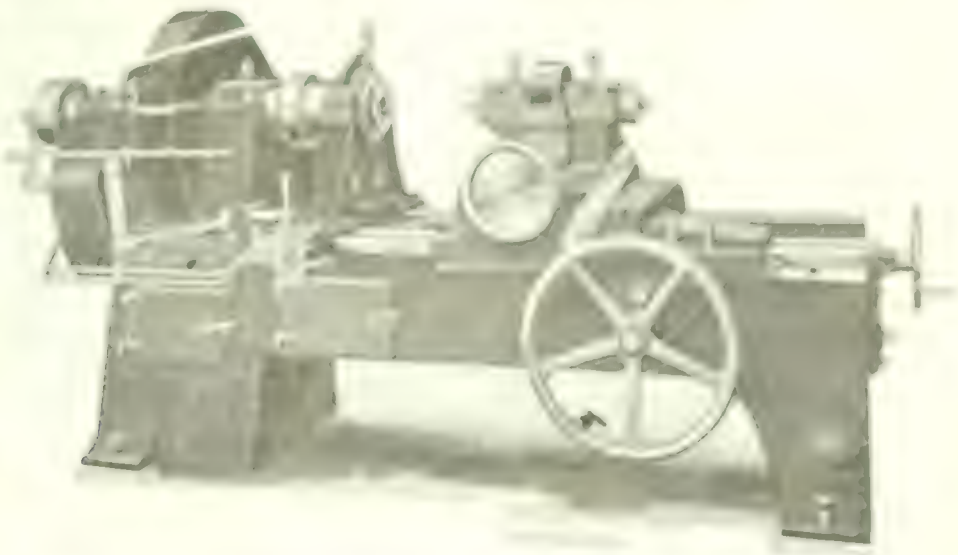

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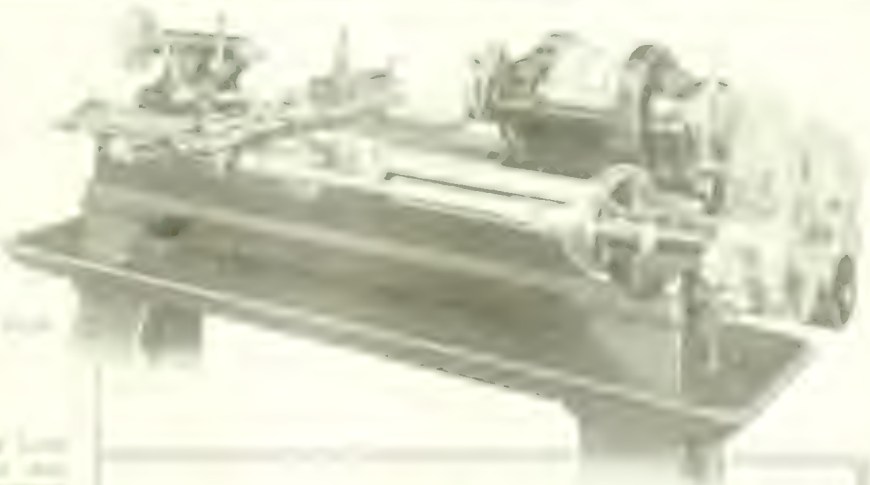

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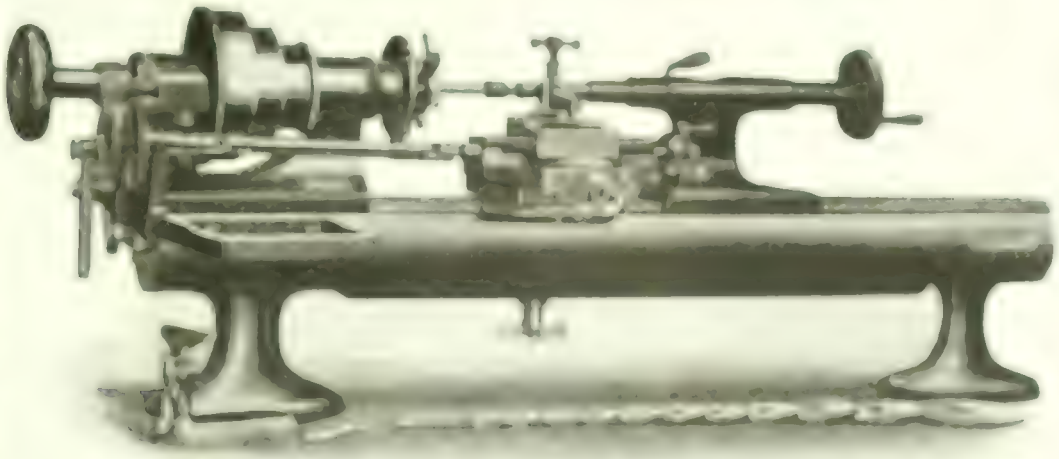

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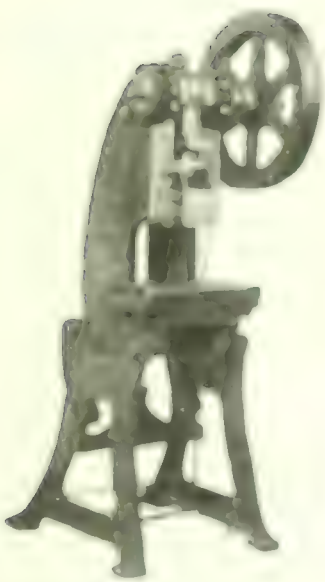

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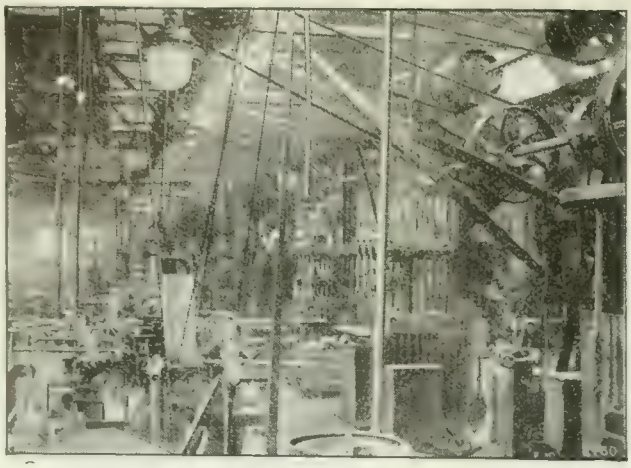

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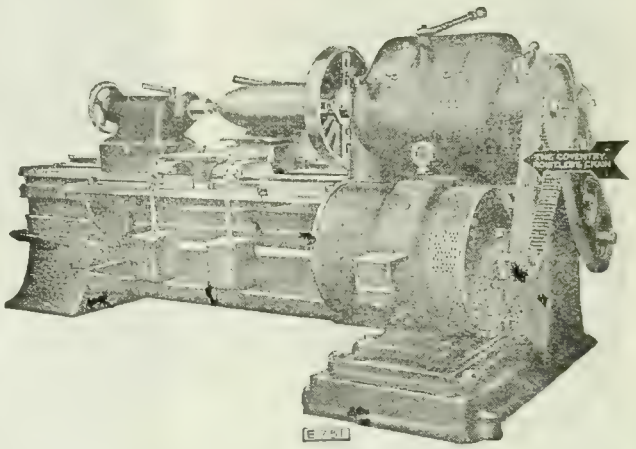

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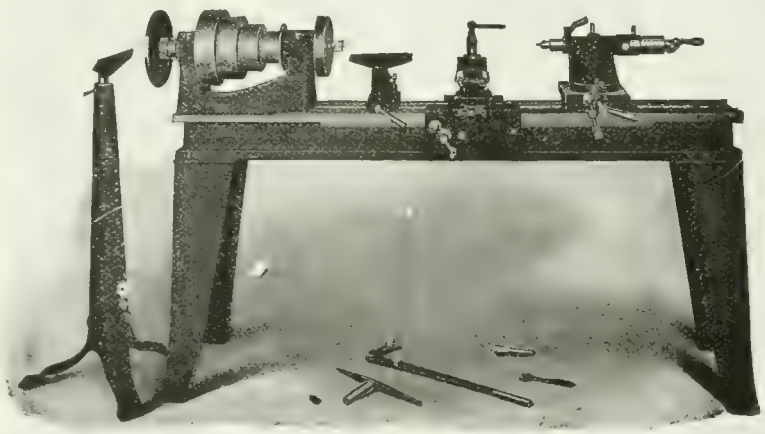

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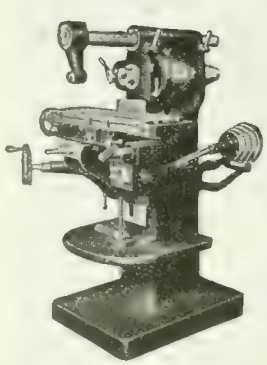

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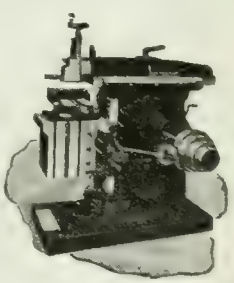

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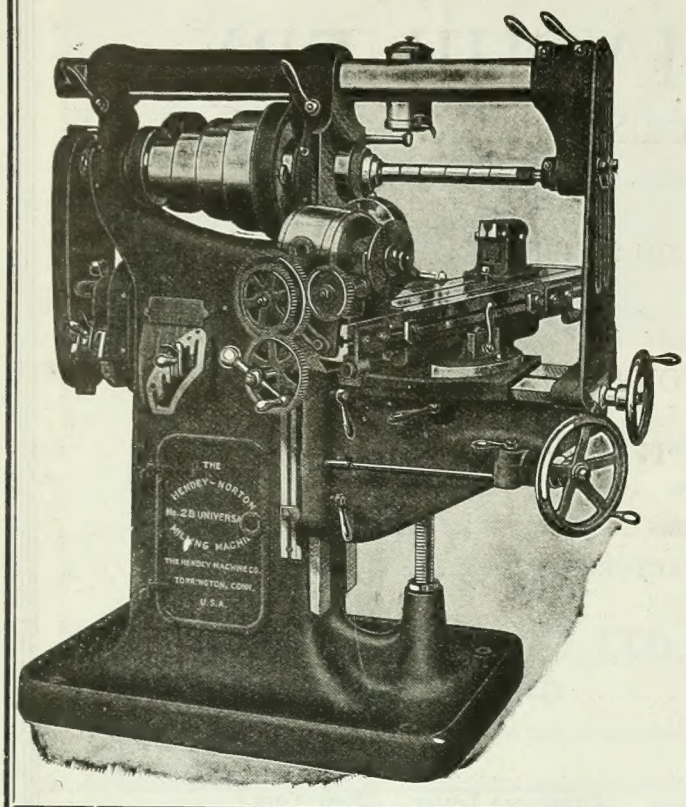

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